SERVICE MANUAL
APPAREL MARKER SYSTEM
P-600 / M-28

This is the first edition of the P-600 / M-28 Service Manual. Subsequent updates or revisions will be announced on this page.

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Chapter 1 *Introduction and Overview*

Chapter One provides an overview of the Service Manual and important background information about the P-600 Marker Plotter. The following information is covered here:

- How to Use This Manual
- Safety
- Product Overview
- Limit of Liability Statement
- Ioline Warranty Policy
- Serial Number Identification
- Glossary

How To Use This Manual

This Service Manual explains most aspects of the Ioline P-600 Marker Plotter including product specifications, installation directions, and testing and repair procedures.

Chapter 1 of the manual provides introductory information and general specifications.

Chapter 2 describes the basic setup procedures for the P-600 and the Control Center software. This section is intended to supplement the *P-600 User's Guide*. Selected portions of the setup procedure (such as paper loading) have been added to emphasize their importance.

Chapter 3 familiarizes the user with how the P-600 operates and how to use the software to maximum benefit. This section also supplements the *P-600 User's Guide*.

Chapter 4 is a troubleshooting and testing guide.

Chapter 5 provides details for repair and maintenance of the P-600.

Illustrations is an index of illustrations throughout the Service Manual.

Appendix sections contain technical drawings and reference material.

Safety

Warnings And Cautions

Please read the safety guidelines that are explained below before beginning the testing and replacement procedures explained in chapters 5 and 6.

WARNING

Warnings call attention to safety procedures that must be followed in order to avoid potential personal injury.

Cautions call attention to procedures that are required to maximize equipment performance.

Basic Safety Guidelines

Comply with the following safety guidelines in order to prevent electrical shock and other injuries.

- Only qualified service personnel should attempt any of the subsystem testing or replacement procedures that are described in this manual.
- Unless otherwise noted, all subsystem testing or replacement procedures must be performed with the P-600 turned off and the power cord removed from the rear panel. This will avoid the possibility of electrical shock.
- Before beginning any subsystem testing or replacement procedure, make sure that the P-600 is on a flat, stable, clean, and dry surface.
- Keep fingers, hair, and clothing well clear of the P-600 whenever moving parts are being tested.
- When working on electronic components use a grounding wrist strap to prevent electrostatic damage. If a wrist strap is not available Ioline can provide one.

Product Overview

The Ioline P-600 Marker Plotter can handle any large format plotting operation up to 72 inches (1.8 meters) wide and 600 yards (545 meters) long. Three industry standard plotter languages (HPGL 7475, HPGL 7596, and DMPL) are supported. It is most commonly used in conjunction with apparel design software for plotting large marker plot patterns. The P-600 also comes with Control Center software that allows adjustment of a variety of system settings from the computer.

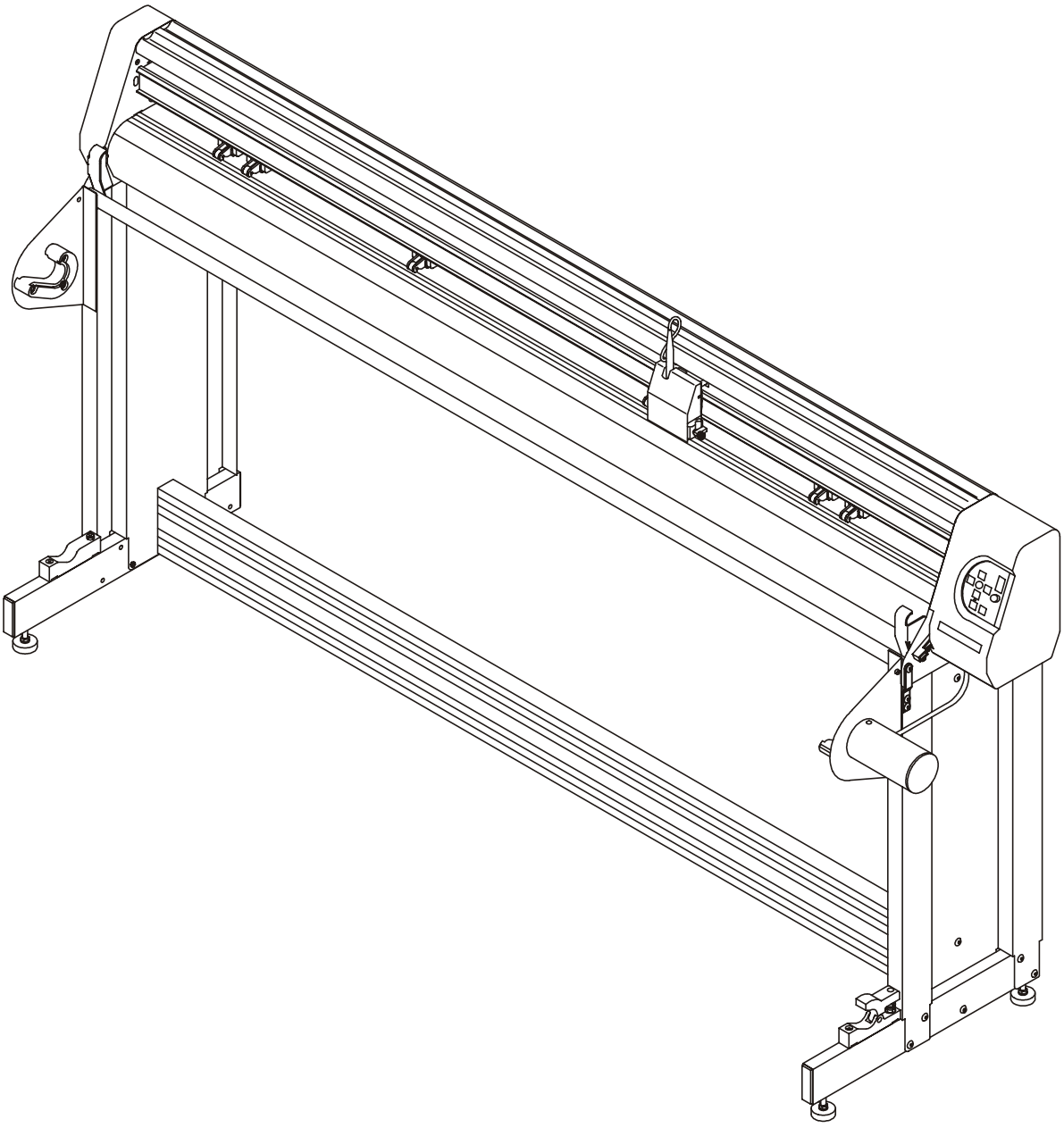

Figure 1-1. Ioline P-600 Marker Plotter.

Specifications

Plotting Speed (Max)	30 in/s
Plotting Acceleration (max)	2 g
Pen Force	1 to 275 g
Plotting Throughput	Up to 47 m/hr (52 yd/hr)
Maximum Frame Size	Length: 1.17 m (46.0 in.) Width: 1.88 m (74.0 in.)
Frame-To-Frame Alignment	Within 1.27 mm (0.050 in.)
Intra-Frame Repeatability	Within 0.51 mm (0.020 in.)
Roll Media Inside Core Diameter	76 mm (3.0 in.)
Maximum Outer Roll Diameter	228 mm (9.0 in.)
Paper Width	0.91 m (36.0 in.) to 1.80 m (74.0 in.)
Maximum Paper Take-Up	545 m (600 yd) #30 paper 455 m (500 yd) #35 paper
Scale	1% to 999%
Pens	Refillable or disposable HP-style fiber, roller ball (ball-point), or felt tip. 0.25 in. to 0.90 in diameter.
Power Requirements	90-264 VAC, 47-66 Hz, 160 watts
Overall Physical Dimensions	Height: 1.17 m (46 in.) Width: 2.26 m (89 in.) Depth: .56 m (22 in.)
Shipping Weight	129 kg (285 lbs)
Environmental Range	Temperature: 0-35 °C (32-95 °F) Relative Humidity: 30% - 85% (non-condensing)
Hardware Interface	Standard RS-232C serial interface: 9600 Baud, No parity, 8 data bits, 1 stop bit, hardware or software (XON/XOFF) handshaking, DB-25S connector, requires DB-25P mating connector.
Command Languages	DM/PL, HP/GL: HP-7475 & HP-7596

How The P-600 Works

The P-600 combines media and pen motion to create vector plots. Vector files are sent to the plotter via a serial connection with a computer or file server. When a file is sent to the plotter the electronic logic system translates the vectors into instructions for the X Axis (paper motion) and Y Axis (pen motion) motors and uses optical encoder feedback to ensure that plotting accuracy is maintained. Long plots are accomplished by breaking the plot file into frame segments and rolling the completed frames onto a take-up shaft.

Paper Movement:

Media motion is accomplished by pinching paper between a grit shaft and chartwheels mounted on a square shaft. The X-Axis transmission rotates the grit shaft so that, when the chartwheels are locked in the down position, paper can be moved in two directions on the X-Axis. Long plots are rolled onto a front take-up shaft that also helps pull paper off of the feed roll during frame advance.

Pen Movement:

The Y-Axis transmission powers a timing belt that transports a V wheel carriage along the Y-Axis traverse extrusion. The pen is attached to the carriage and is made to contact the paper by actuating a voice coil. When not plotting the pen is held above the paper by spring action.

Limit Of Liability Statement

It is the responsibility of the operator to monitor the performance of the P-600 and maintain it in proper working condition by following the operating and regular maintenance instructions. It is also the responsibility of the operator to follow all safety precautions and warnings that are described in this manual. Ioline is not responsible for injuries that may occur as a result of unsafe operating procedures or for degraded performances as a result of failure to maintain the P-600.

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Ioline Warranty Policy

Ioline Corporation provides a 12 month parts and labor warranty on all new equipment and 90 days on repair parts, unless specifically noted otherwise. Every unit is recorded by serial number when it leaves the factory. If the serial number indicates the unit exceeds 15 months old, then the user must provide proof of extended warranty.

For warranty service, the end user must work through their dealer. Ioline Customer Service is available to assist Authorized Dealers in the performance of their equipment support.

Serial Number Identification

Identification of Ioline Corporation products is accomplished by use of a serial number located on the back of the plotter. You can determine the model and date of manufacture by interpreting this serial number.

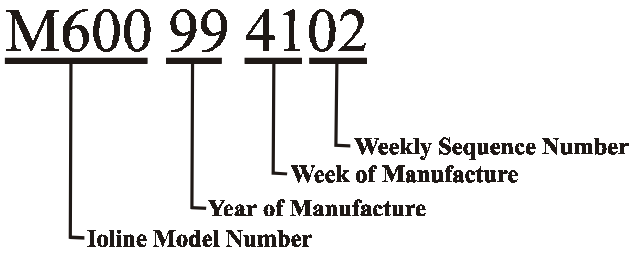

Figure 1-2. Ioline Serial Number Indications.

Glossary

1. BOM	Bill(s) of materials for an assembly
2. BOTTOM PAN	Metal housing protecting the underside of the plotter.
3. CARRIAGE	The component that holds the pen and frame sensor. It travels along the Y-Axis on the traverse assembly.
4. CHART TAPE	Slick white tape located under the pen to cushion and protect the platen and pen if it runs off the paper.
5. CHART WHEELS	Roller wheels that push the paper against the grit shaft.
6. FRAME SENSOR	The electronic eye that reads frame position and adjusts plotting perameters so that the frames are aligned properly.
7. GRIT SHAFT	A traction roller bar designed to grip and move material under the chart wheels.

8. KEYPAD	Where the user controls simple plotter functions. Carriage and media motion is accessible from here during stop mode.
9. PLATEN	Curved surface that houses the grit shaft and supports the material during plotting.
10. SQUARE SHAFT	Shaft that raises and lowers the chartwheels when rotated. Provides proper traction on the material during operation. Located below the traverse assembly.
11. TRAVERSE ASSEMBLY	Structure that supports and guides the carriage.
12. X-AXIS	Direction of paper moving over the platen. Usually associated with the grit shaft .
13. Y-AXIS	Direction of pen motion. Usually associated with the carriage.

Chapter 2 Setting up the P-600/M-28

This chapter outlines the procedures required to properly setup and configure the P-600 plotter and the control center software. The following subsystems and procedures are explained and illustrated:

- Assembling The P-600
- Loading Paper
- Software Installation

Assembling The P-600

The first step in setting up the Machine is to remove the plotter from the box and place it on a flat surface until it is ready to be attached to the stand. Check the packing list carefully to make sure that all of the accessories and parts are present. **Save all of the packing materials and the box so that the Machine can be returned to Ioline for service if necessary.**

Assembling The Stand

Assembling the stand requires two people. One person should hold the parts in place while the other person uses the supplied hex wrench and screws to fasten everything together. You must assemble the stand on a flat, level surface.

1. Locate the two crossmembers, and each stand leg.
2. Attach the bottom crossmember to the stand leg. As shown in Fig 2-2. Use one medium length screw, and one long screw for the bottom crossmember.

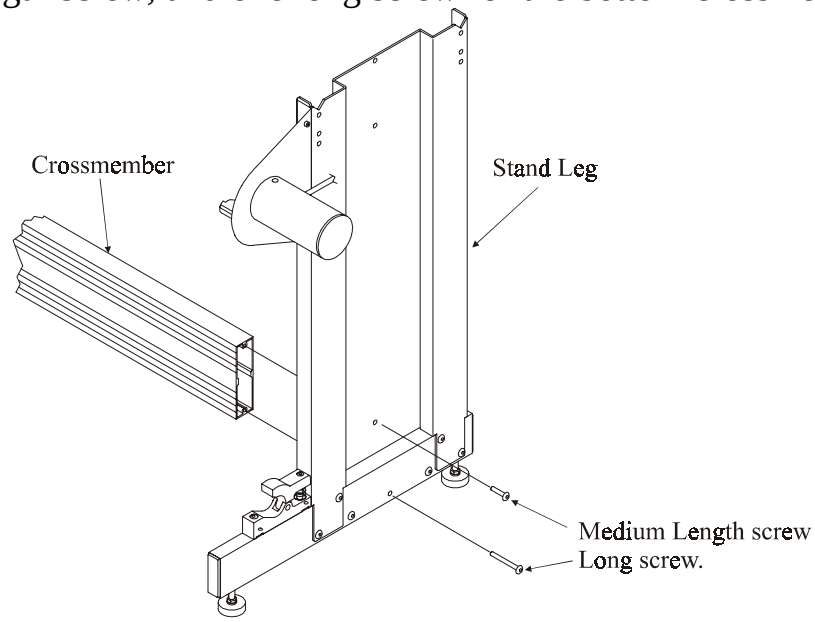

Figure 2-2. Attaching the Bottom Crossmember to a Stand Leg.

Repeat procedure #2 to attach the other end of the crossmember to the second stand leg. Note the position of the crossmember and the screws in Figure 2-3.

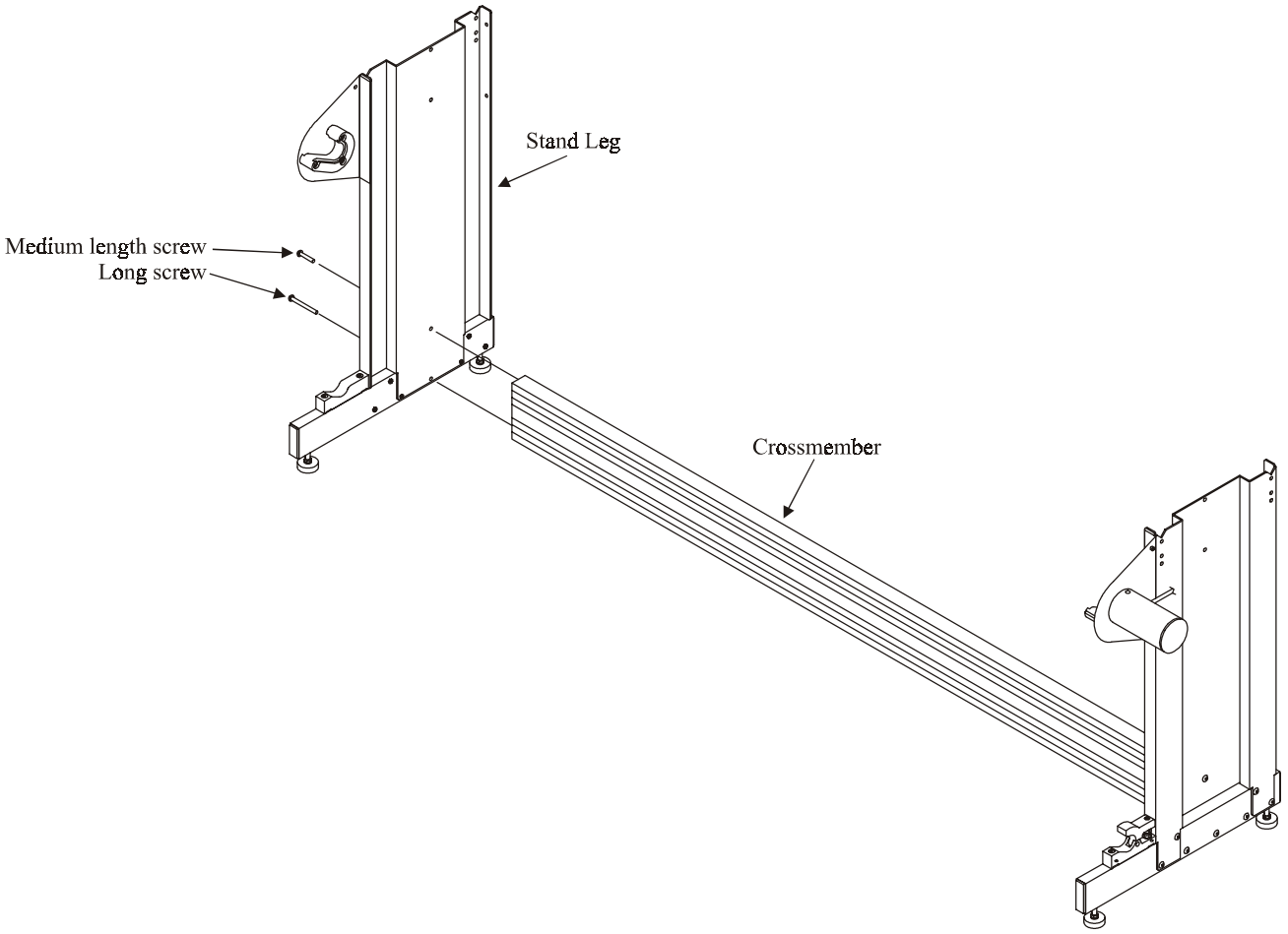

Figure 2-3. Attaching the Bottom Crossmember to the other Stand Leg.

Installing the top crossmember

To attach the top crossmember, have the second person hold one end while screwing the crossmember to the leg. Use 4 of the medium length screws. See figure 2-4

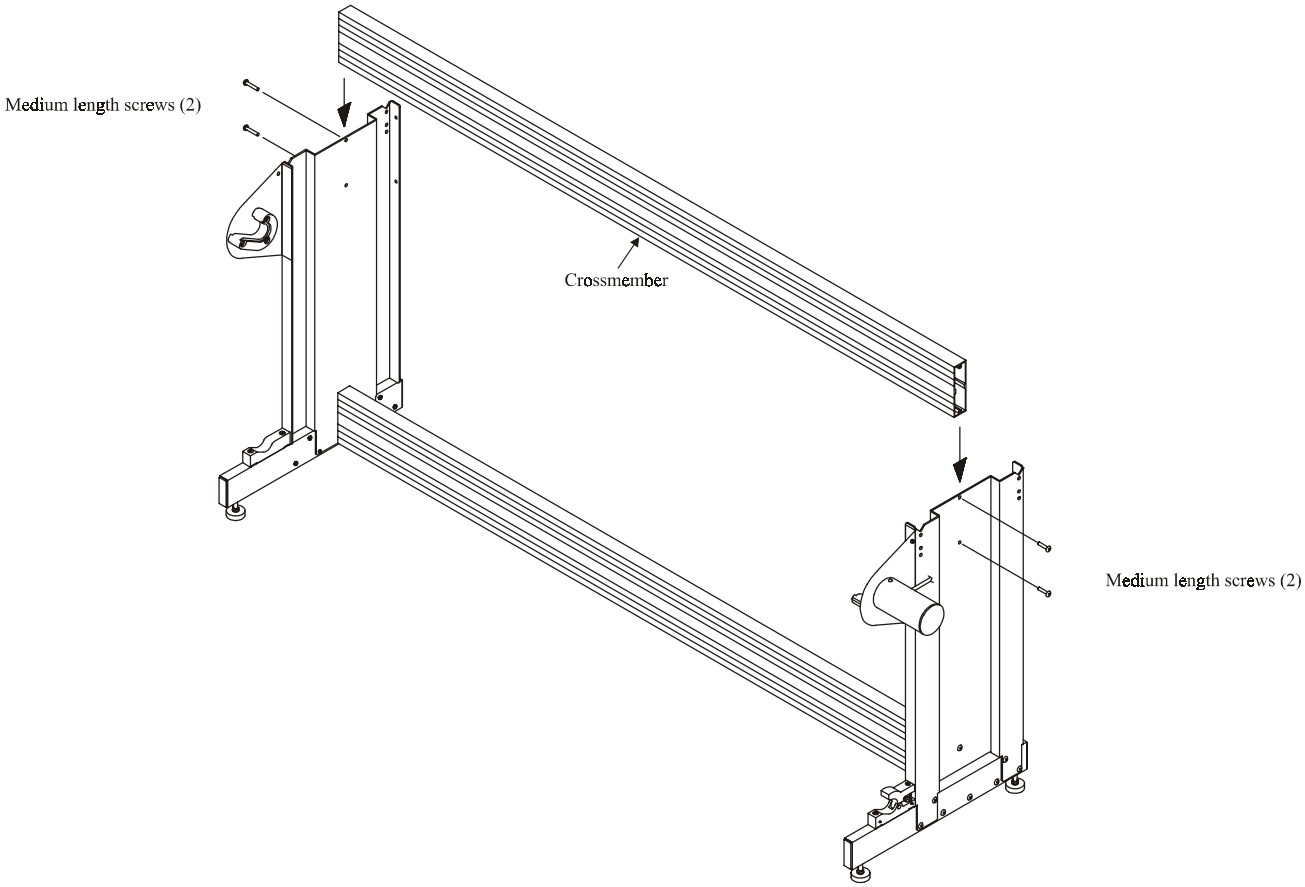

Figure 2-4. Attaching the Top Crossmember to the Stand Legs.

Attaching the static Dissipaters

A large amount of static can build up from paper feeding off a large roll. The machines ability to track correctly can be greatly affected by static build up. Not to mention, electronic parts DO NOT LIKE STATIC. To help keep this problem to a minimum, using the static dissipaters is recommended. Attach the two static dissipaters to the stand by placing the hooks through the holes in the stand legs. Refer to Figure 2-7 (the P-600 is not shown).

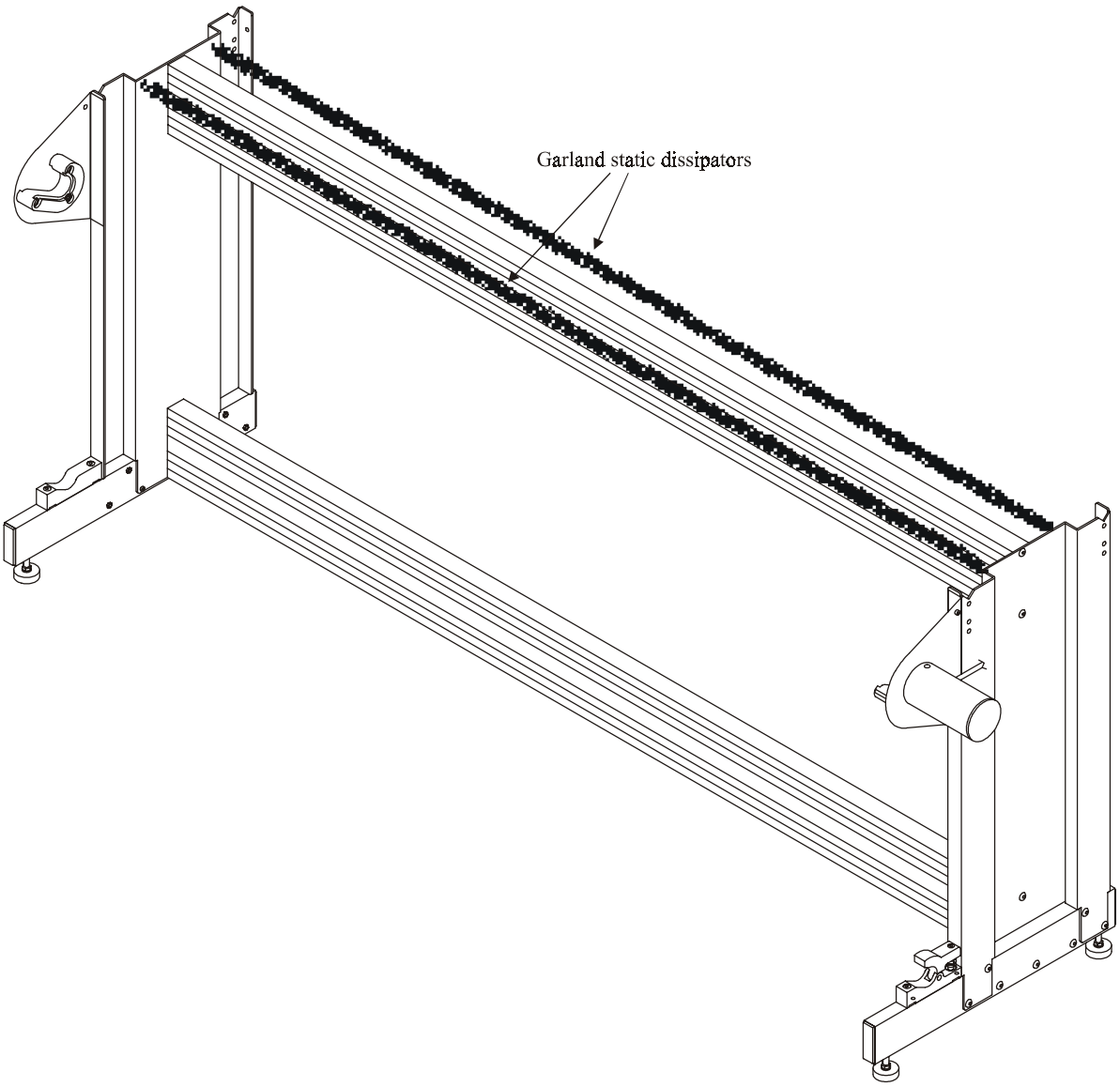

Figure 2-7. Attaching the Static Dissipaters.

Leveling the Stand

When the P-600 Marker Plotter is attached to the stand the entire unit must be level. The feed shaft, take-up shaft, and platen must all be aligned and parallel to ensure proper operation.

1. Make sure the stand is on a flat level surface. Place a level on the horizontal surface in the center of either the stand or crossmember. See figure 2-8.
2. Use an adjustable wrench to loosen the lock nut of one of the leg levelers.
3. Turn the leg leveler to raise or lower one end of the leg assembly until it is level.

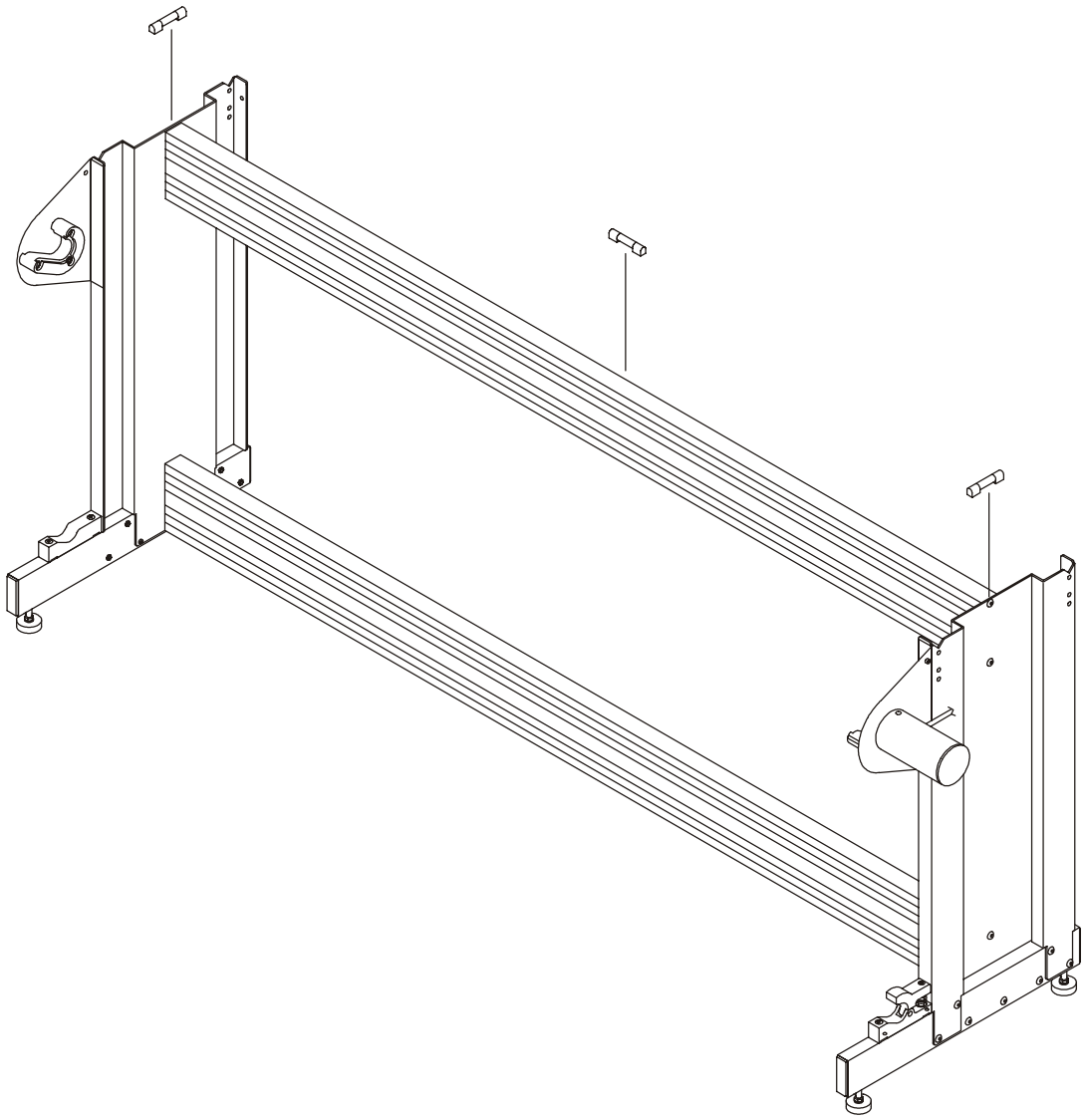

Figure 2-8. Leveling the Legs.

Attach Plotter To The Stand

Attaching the P-600 to the stand requires two people. Make sure the stand is fully assembled and completely stable before beginning. One person should be positioned at each end of the plotter. Grasp the front and back bars where they attach to the end plates and gently lift the Plotter onto the stand. See figure 2-5

Do not lift the P-600 Marker Plotter by the traverse extrusion, the left cover, the motor, the keypad, the pen carriage, or the middle of the front and back bars. This may permanently damage the plotter.

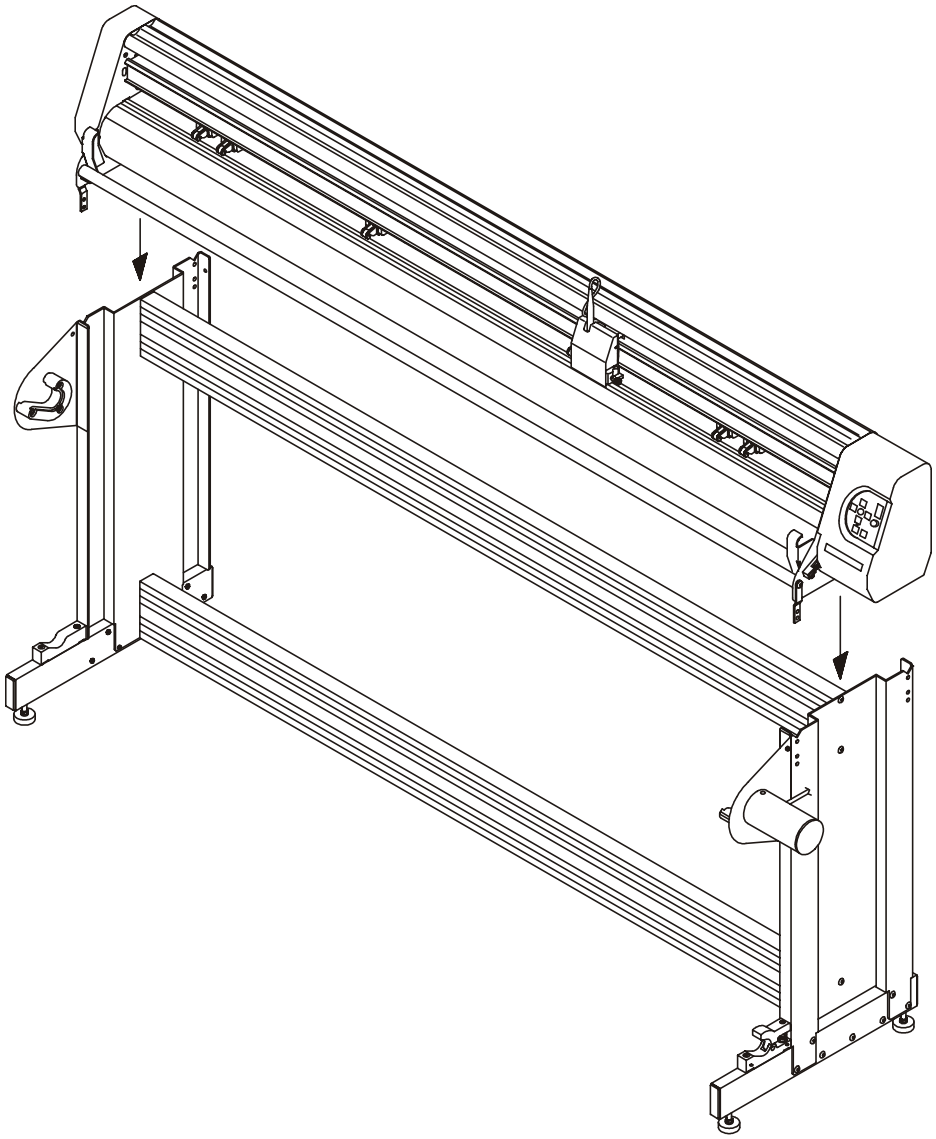

Figure 2-5. Place the plotter on the stand, make sure the front and back bars fit into the their slots.

Inserting The Screws

To keep the P-600 square on the stand it needs to be mounted with six (6) Hex screws. Use the six short screws and the hex wrench to attach the machine to the stand. Use three screws per side to attach each end plate to the stand See Figure 2-6

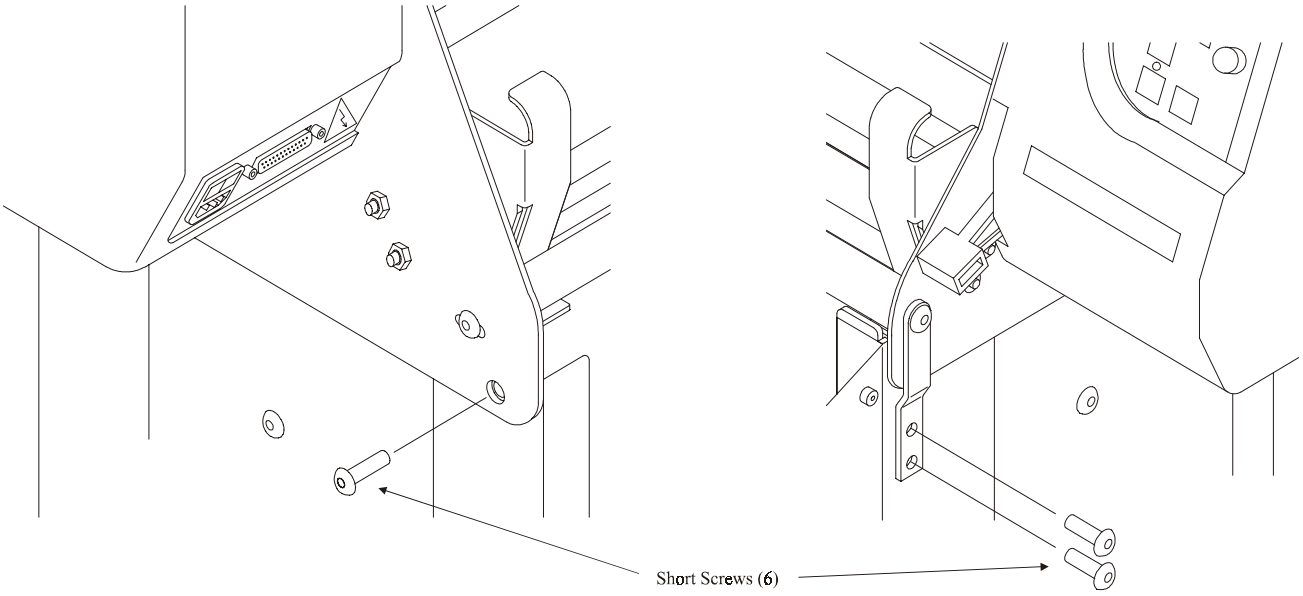

Figure 2-6. Mounting the P-600 to the stand

Cabling Connections

Make sure the power to the computer and the P-600 is off!

Use the power cord in the accessory kit to connect the P-600 to a surge protector. Plug the surge protector into a 3-prong grounded wall outlet. Use the serial cable to connect the serial ports on the rear panel of the plotter and the computer.

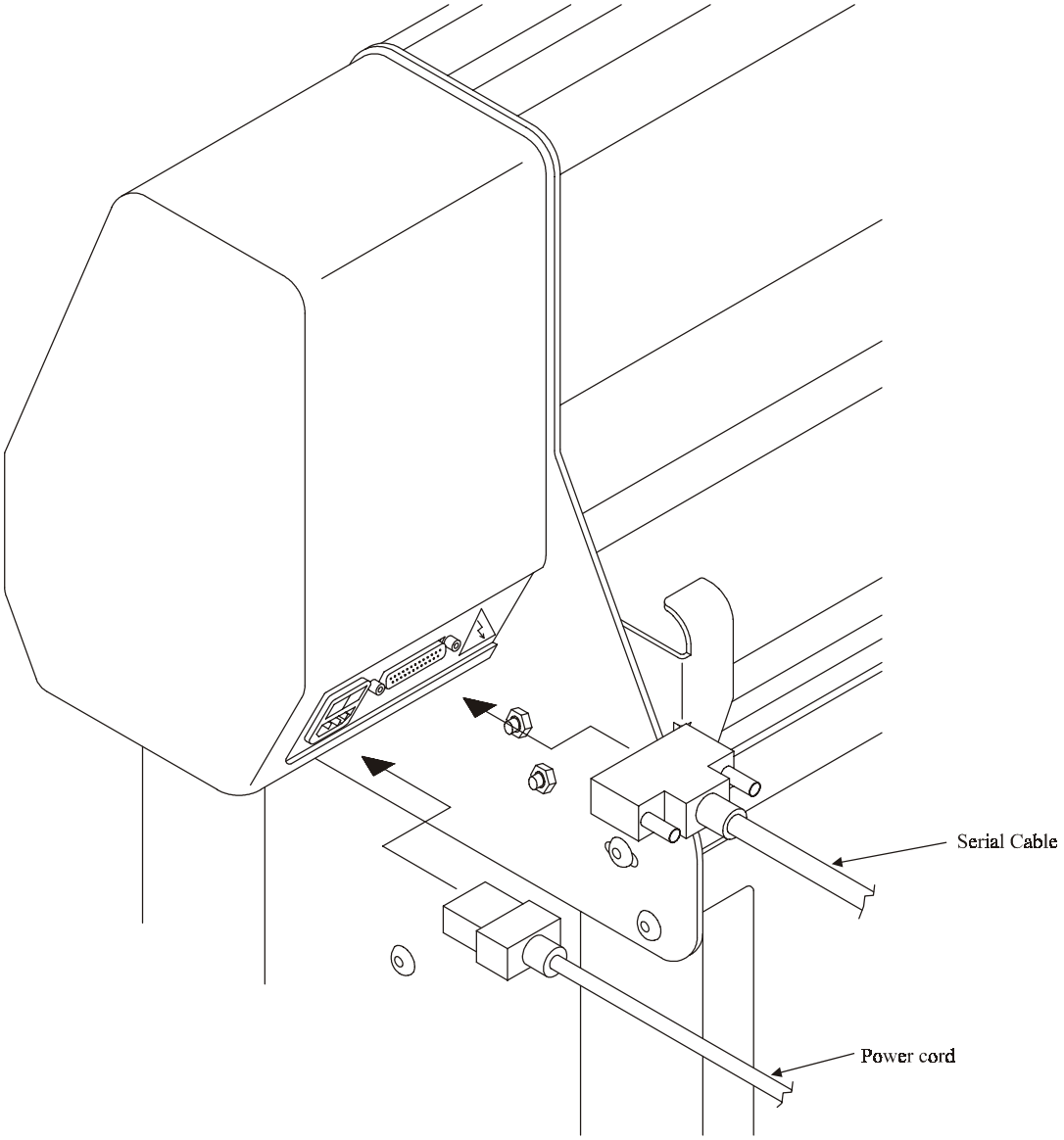

Figure 2-10. The P-600 Marker Plotter's Rear Panel.

Loading A Pen

You can use any pen that has a diameter of .25" to .90" (6.4 mm to 22.9 mm), or any Hewlett Packard compatible pen. A pressurized ball point pen is optimal. Pens with a ball writer or plastic tip will also work but are not as effective.

Ioline does not recommend that a ceramic tipped pen be used.

Gently insert the flange of the pen between the grooves of the pen holder and tighten the thumb screw. Do not over tighten the screw so that the pen becomes dented.

Loading Paper

One of the most important user operations is paper loading. Proper media loading directly affects tracking and can vastly improve the plotting performance of the P-600. It is important at this point to distinguish between the feed shaft and the take-up shaft. The feed shaft is a hollow tube with a flanged hub on one end that supports the unplotted paper roll. The take-up shaft is similar to the feed shaft except that it has a three inch (7.6 cm) diameter silver tube attached to it and it rolls up the plotted frames during the marker plotting process.

Assembling The Feed Shaft

(Use Figure 2-11 as a reference)

1. Two feed shaft paper hubs are located in the stand accessory kit. Make sure that both set screws will not interfere with the free movement of the hubs on the feed shaft.
2. Slide one hub onto the feed shaft with the narrow end pointing away from the flanged coupler.
3. Insert the feed shaft and hub through the paper roll until the hub is snugly seated into the cardboard dowel at the center of the paper roll. Slide the other paper hub onto the feed shaft with the tapered end pointing toward the flanged coupler. Seat the second hub into the cardboard dowel.
4. Firmly insert the metal hub on the flanged coupling end of the roll by hitting the end of the feed shaft with a rubber mallet.
5. Slide the feed shaft through the paper hub on the end opposite of the flanged coupler so that it does not protrude. Firmly seat the second hub with a rubber mallet.
6. Lift the feed shaft (with the paper roll) into the feed shaft support blocks on the lower front of the machine (see figure 2-11). Make sure the paper pulls from the bottom of the roll when placing it on the stand. The flanged coupling should be on the keypad end of the plotter.

Centering the paper roll

Center the paper roll between the two stand end plates by sliding it to the left or right along the feed shaft. Make sure the hubs remain securely in place in the paper roll. When you have the paper centered use the hex wrench to tighten the button head screws on each paper hub.

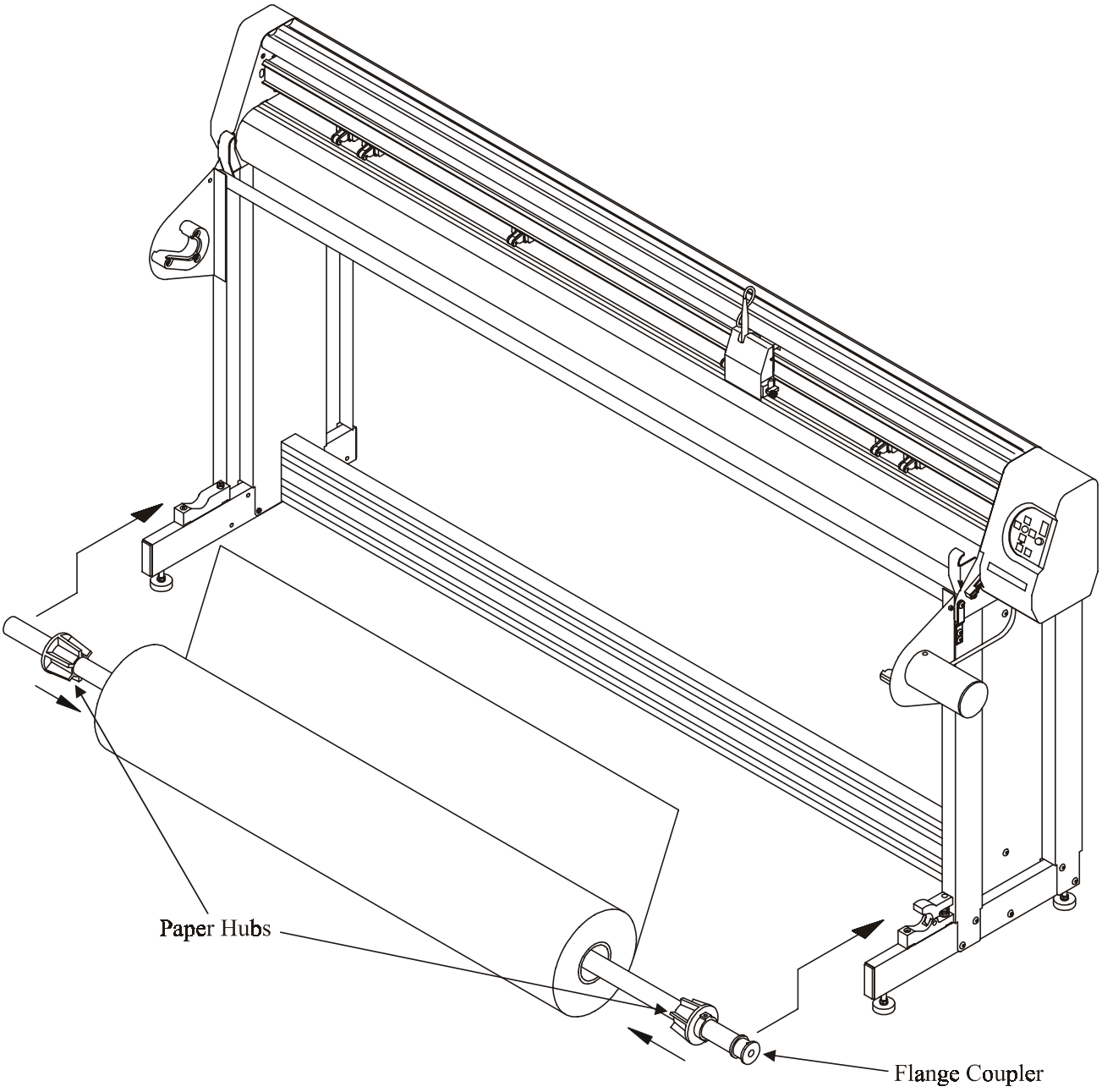

Figure 2-11. Installing the Feed Shaft.

Assembling The Take-Up Shaft

Hold the paper guide flanges together with the flat sides of the flanges touching. Slide them both onto the take-up shaft. Put the roll feed take-up shaft onto the take-up shaft supports on the front of the machine. The flanged coupling must be on the keypad side of the plotter.

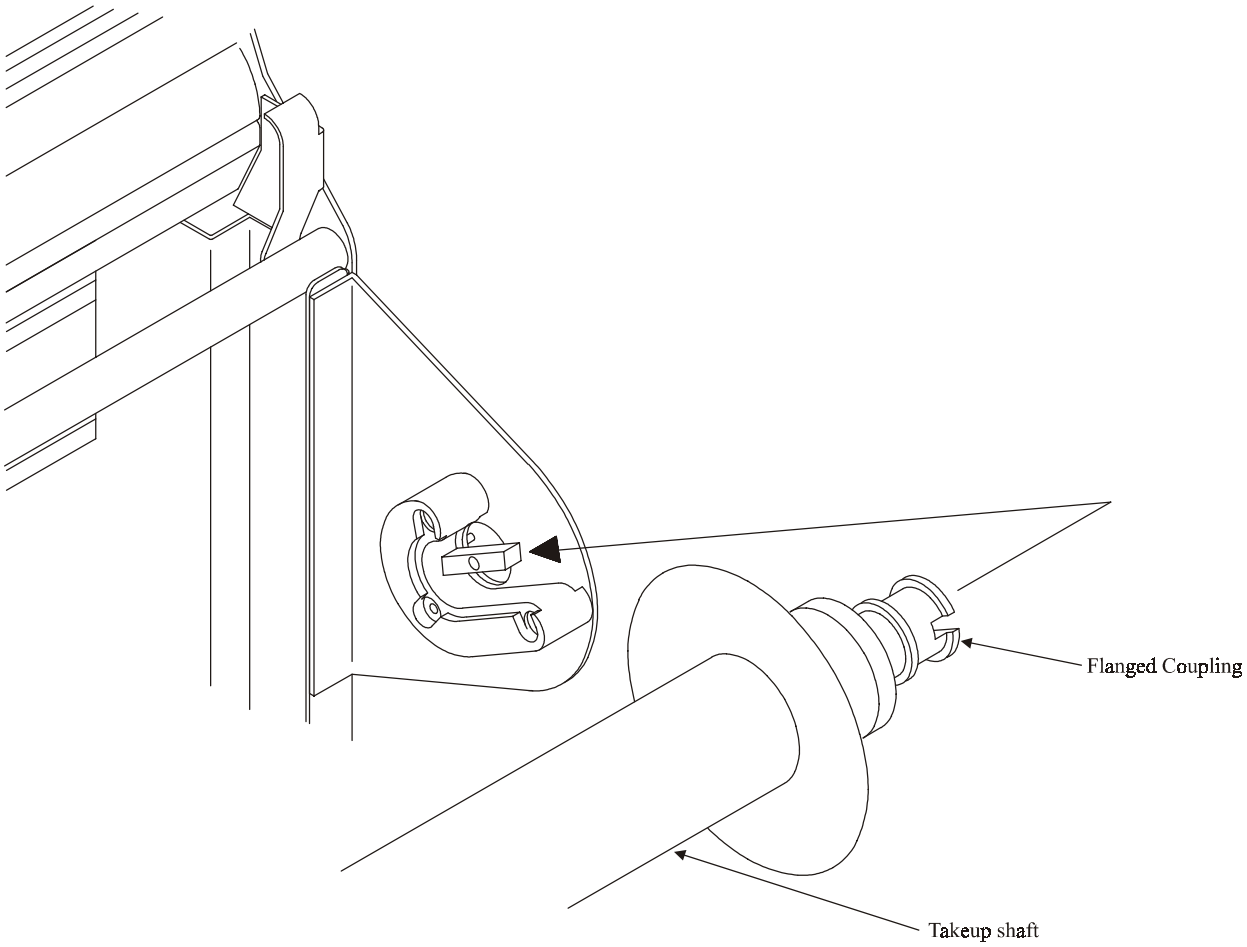

Figure 2-12. Loading The Take-Up Shaft.

Slide each of the take-up shaft paper guide flanges toward the stand end plates to create enough room for the width of the paper. You may have to loosen the guide flange thumb screws.

Feeding Paper Over the Platen

1. Turn on the P-600 Marker Plotter.
2. If the chartwheels are lowered, raise them by lifting the chartwheel lever on the keypad side of the machine.
3. Pull some paper off the paper roll and feed it over the back bar, the platen and under the raised chartwheels.

Make sure the paper is even, taut, and square as it is pulled off the paper roll.

Attaching Paper to the Take-Up Shaft

Be sure the paper goes over the front and back bars of the machine, and around the underside of the take-up shaft. (See figure 2-13).

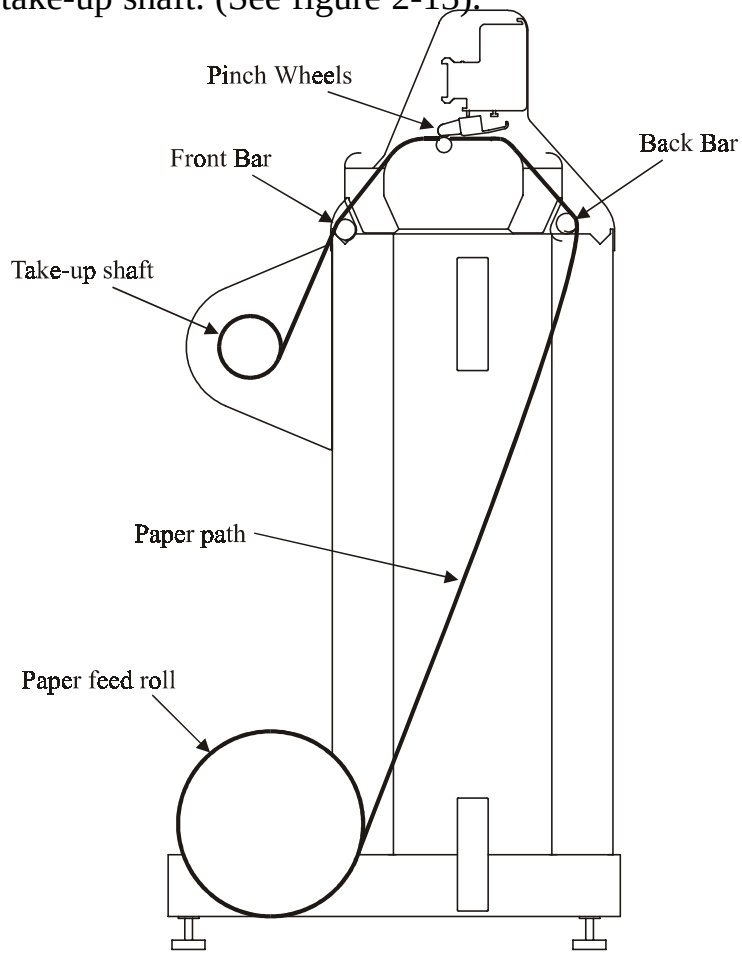

Figure 2-13. Paper path through the P-600. (side view)

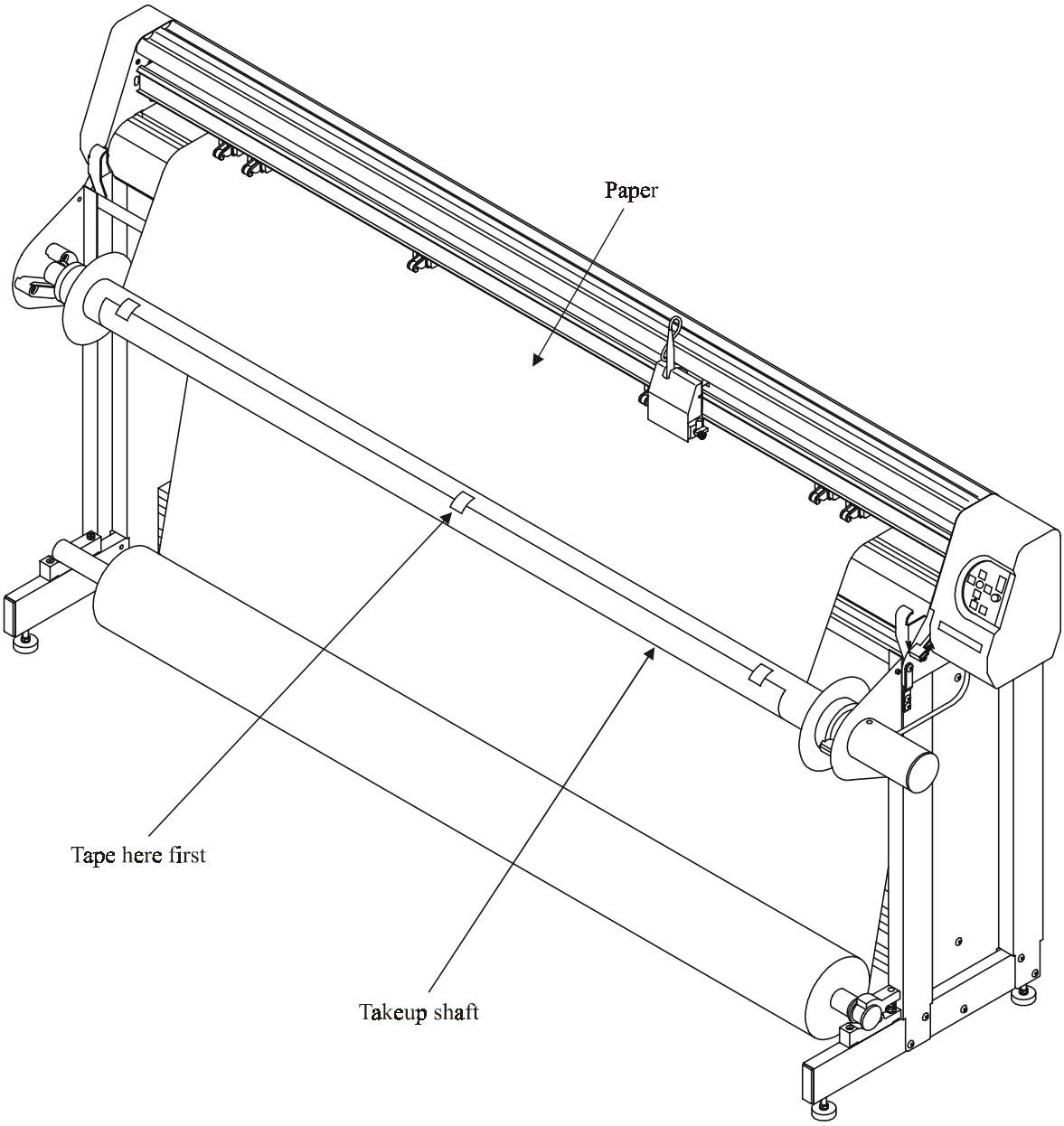

Figure 2-14. Taping the Paper to the Take-Up Shaft.

The paper must be taut and square from the feed shaft paper roll over the platen to the take-up shaft.

Press the roll feed key down arrow to pull some paper off the feed roll, until the paper wraps around the take-up shaft 2 or 3 times.

Positioning the Chartwheels

There are six chartwheels mounted on the square chartwheel shaft. Position both outermost pairs of chartwheels six inches (15 cm) in from the outer edges of the paper.

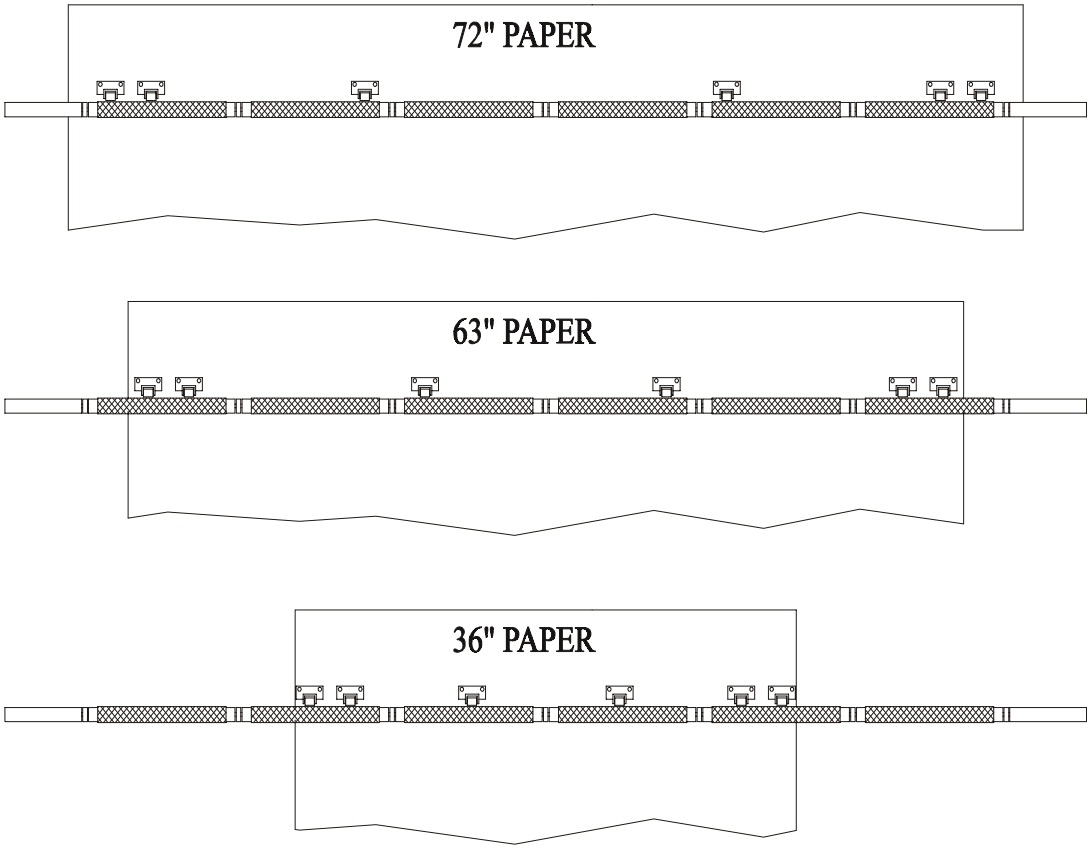

Figure 2-15. Positioning the Chartwheels.

Make sure the paper is taut and square in front and in back of the Machine. Clamp the paper to the grit shaft by lowering the chartwheel lever on the keypad side of the P-600.

Installing the Dancer Bars and Paper Guide Flanges

To keep the paper taught at all times during operation, install the dancer bars. Slide the dancer bars into the dancer bar channels as shown in figure 2-16.

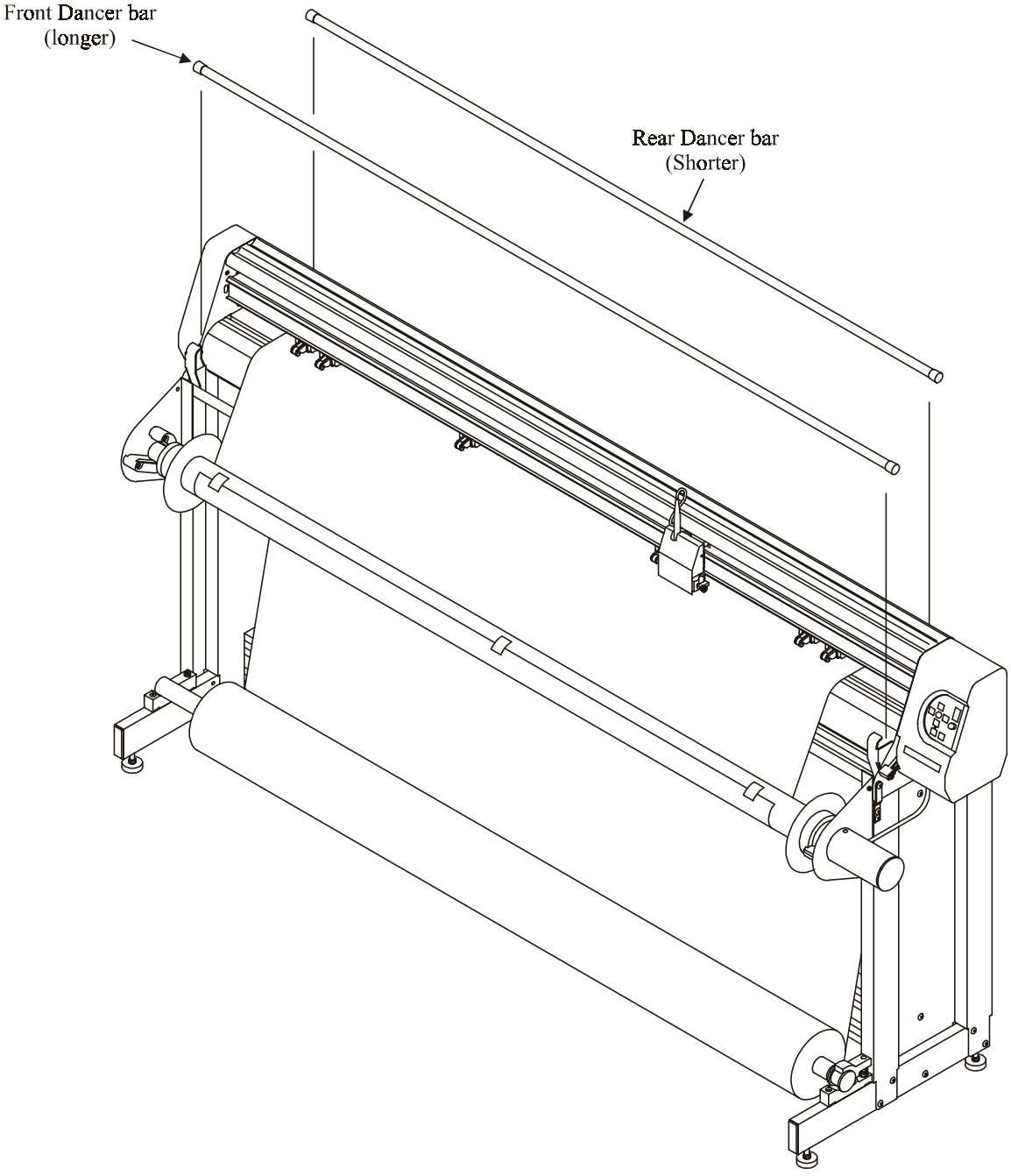

Figure 2-16. Installing the Dancer Bars.

Adjust the take-up shaft paper guide flanges to within 1/32 of an inch (1 mm) of each edge of the paper. Then tighten the paper guide flange thumb screws.

Preparing to Send a File

1. Make sure a pen is installed in the pen holder.
2. With the left or right arrow keys, move the pen carriage to the position where the next plot should begin. Press the Start Point key (See Chapter 3 for more information).
3. The Plotter will create a measured feed loop the length of the plotter's frame size length setting. The factory default frame size is 46 inches (117 cm).
4. Check the paper path against Figure 2-17 to ensure proper installation.
5. The P-600 Marker Plotter will then switch to Start mode (green LED on) and be ready to accept a plot file from the computer.

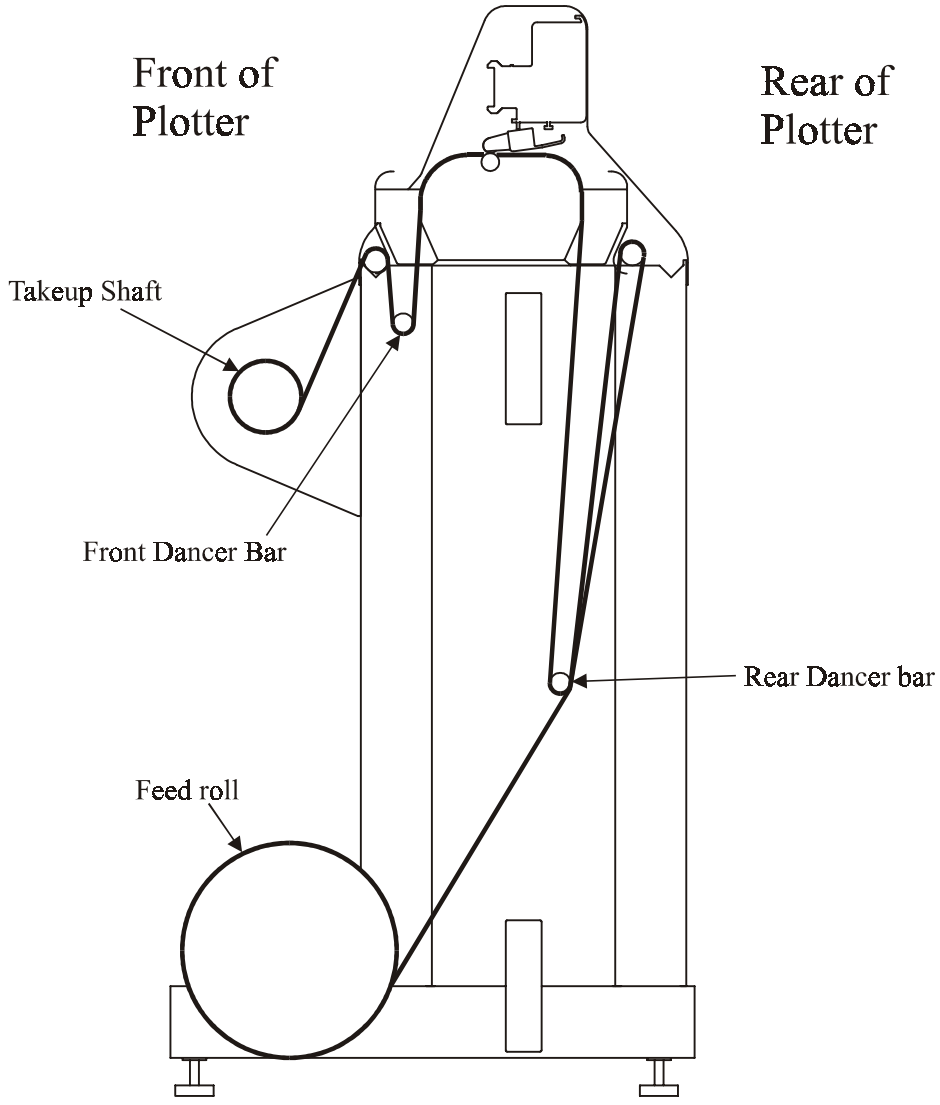

Figure 2-17. The Correct Paper Path.

Software Installation

The Ioline Control Center is a Microsoft Windows compatible program that comes on a 3 1/2" floppy disk with the Plotter, or it is available on-line at www.ioline.com. A Macintosh version is available upon request. The Control Center software has three functions:

1. Allow adjustment of plotting parameters.
2. Send completed plot files (.plt) to the Plotter.
3. Provide diagnostic tests and test files for troubleshooting.

Installing the Ioline Control Center Software

The Microsoft Windows version of the Control Center program can use either a mouse or the keyboard of the computer to change the default plotter settings. If using the keyboard, note the following guidelines:

- Use the Tab key to cycle through the screen fields.
- Use the up/down cursor movement or numeric keypad keys to change a numeric value within a highlighted menu field.
- Use the Alt key to toggle between the screen fields and the pull down menus.
- Use the Enter key to select a highlighted field when a pull down menu is open.

Microsoft Windows 3.1 Installation

1. Start Windows.
2. Insert the Control Center disk into drive A: (or B:)
3. Make sure the plotter is turned on and that the green LED is visible.
4. Choose File, Run from the Program Manager menu bar.
5. Type A:\SETUP (or B:\SETUP) and Click OK.
6. Follow the instructions that appear on the screen.
7. When the Windows installation is complete, a Control Center Setup screen similar to figure 2-18 will appear.

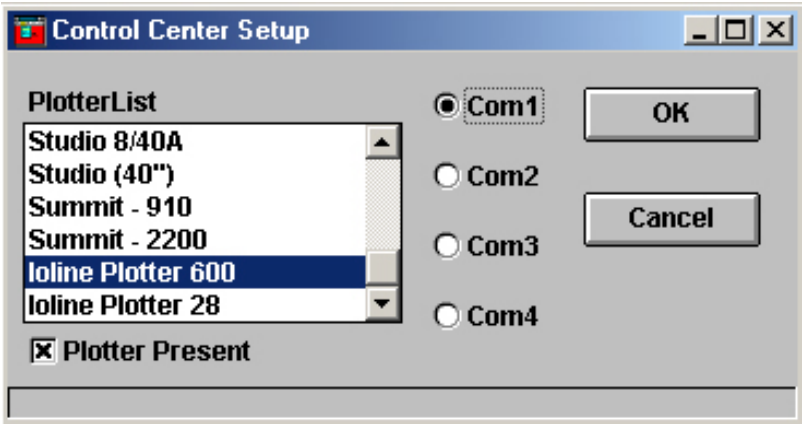

Figure 2-18. The Control Center Setup Screen.

8. Select P-600 and the communication port that will be used to send plot files to the plotter. COM2 is the default communication port selection.
9. Select Plotter Present then Click on <OK>.
10. You will see a P-600 Control Center screen similar to figure 2-19.

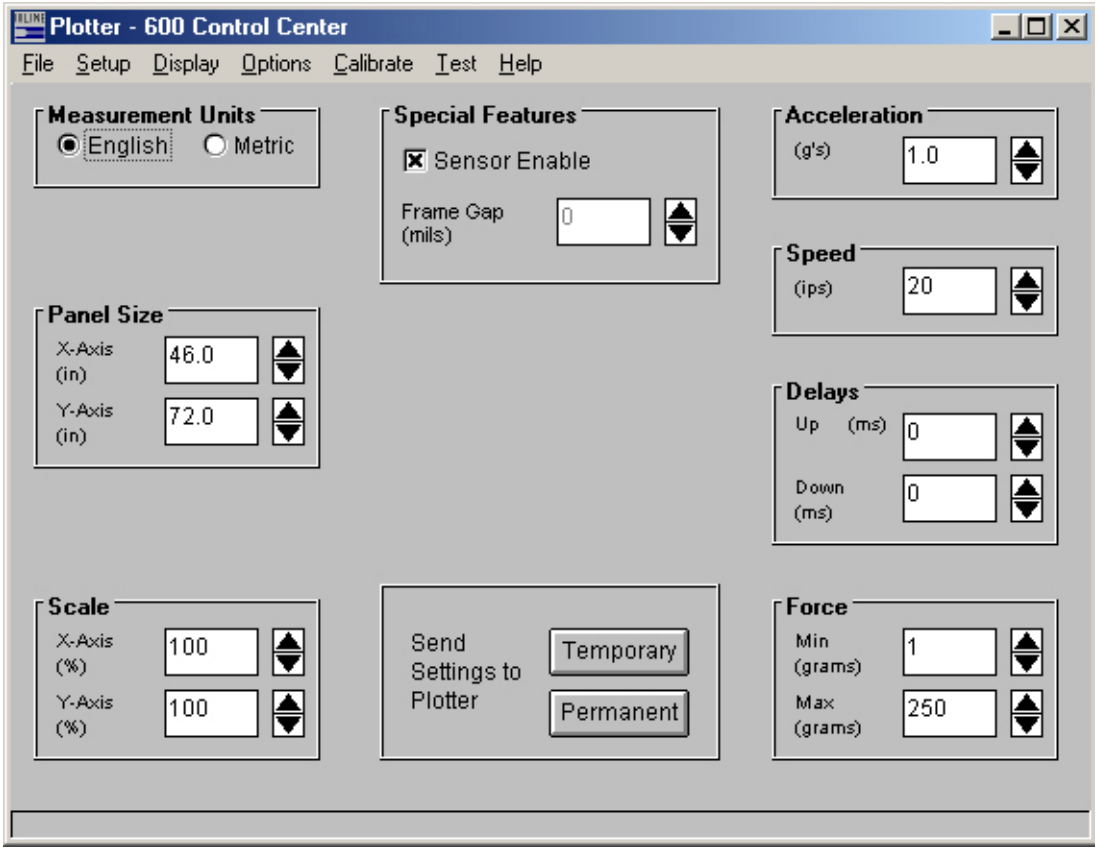

Figure 2-19. The Control Center Main Screen.

Windows 95/98 installation

1. Place the disk in drive A: or B:
2. Click on the “Start” button, then click on “Run...”
3. Select the “Browse” button, and switch to the drive where the disk is installed.
4. Click on Setup.exe and click “OK”
5. In the “Run...” box, click “OK”.

The install wizard will now start the installation process. Follow the prompts until the installation of the Ioline Control center is finished.

Macintosh Installation

1. Turn on the computer and the P-600 plotter.
2. Insert the Macintosh version of the Control Center diskette into the disk drive of the computer.
3. Drag the entire contents of the diskette to the hard drive of the computer.
4. Open the hard drive.
5. Double click on the SCC Icon. The Control Center will open.
6. Read the installation notes and follow the instructions that appear on the screen.

You will see the P-600 Control Center screen seen in Figure 2-20.

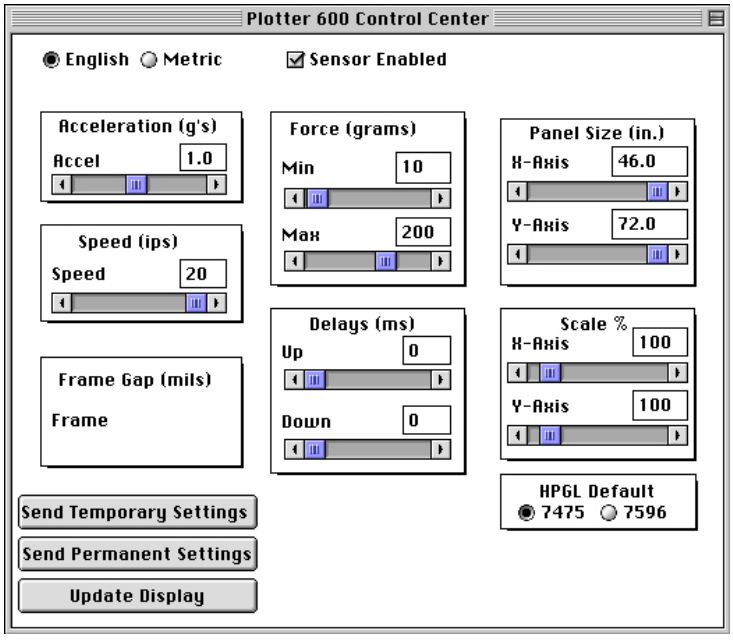

Figure 2-20. The Macintosh Control Center Main Screen.

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Chapter 3 Operation

This section contains guidelines for basic operation of the P-600 Marker Plotter. The following primary topics are explained and illustrated:

- Keypad Controls
- Control Center Screen Options
- Control Center Menu Items

Keypad Controls

The keypad on the P-600 provides control of the motion systems on the plotter as well as access to pen force and frame sensor testing. Communication can also be interrupted and restored and the initial plotting point can be set from the keypad.

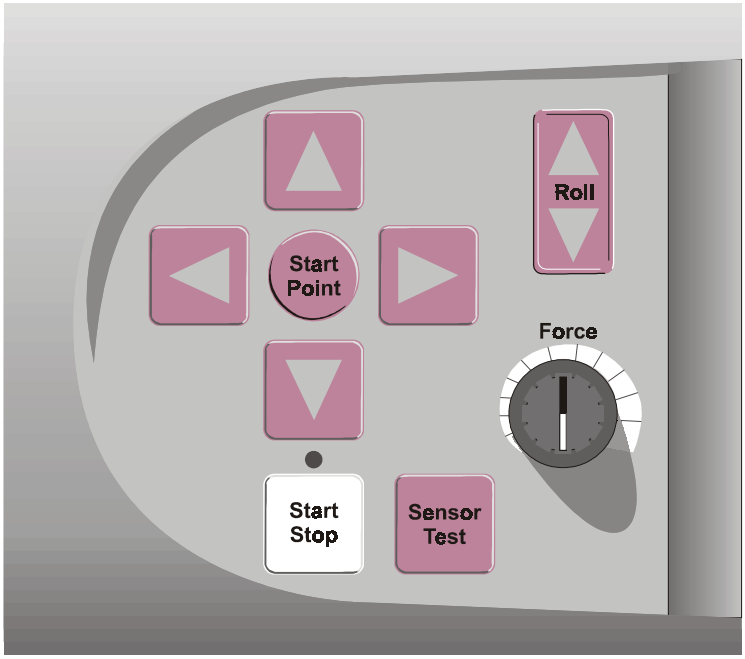


Figure 3-1. The P-600 Keypad.

Arrow Keys

The arrow keys control paper (vertical arrows) and pen carriage (horizontal arrows) movement within the parameters of the P-600's frame setting. The plotter must be in stop mode (red LED) to use the keypad arrow keys. The pen and media speeds become greater the longer the key is depressed. The pen carriage has a safety feature that will not allow it to collide with the end plates. The grit shaft will not allow paper motion outside of the plotting frame during plotting operations. Diagonal motion is possible by pressing a vertical and horizontal arrow key simultaneously.

Start Point

You have to set a start point before sending a plot to file the P-600. When the Start Point key is pressed the plotter logic will use the current Y-Axis position of the pen carriage as the starting point of the next marker plot. A measured feed loop the length of the page frame length setting will then be created. The factory set page frame length is 46 inches. When the start point process is finished the LED will turn green and the Summit will accept a plot file.

Before pressing the keypad Start Point key always make sure the paper is taut between the paper roll and the take up roll. There should be no feed loop in back of the plotter.

Roll Switches

The roll feed switches control the rotation of the take-up shaft. The plotter has to be in Stop mode (Red light on the keypad) for the roll feed keys to function. The Roll switch down arrow can be used to pull paper off the feed roll. The Roll switch up arrow will unroll a completed marker plot onto the floor. When a plot is being unrolled the speed will increase after a few seconds of rotation.

Never press the keypad roll feed key when the P-600 is stopped in the middle of a plot.

Pen Force

You can set the pen force by using the knob on the keypad. The minimum and maximum values of the available force can be set from the P-600 Control Center. Pen type determines the correct force setting and range. Excessive pen force could cause the paper to tear.

Sensor Test

The Sensor Test switch provides a means of testing the frame sensor wand. To perform the test the plotter must be in Stop mode. Press the Start/Stop button until the keypad LED turns red. Press Sensor Test switch. The P-600 will draw a dual axis frame mark and then use the frame sensor to detect the outer edge of each axis. The sensor will pass back and forth over the frame mark, beeping after each pass, until the Sensor Test switch is pressed again.

Start/Stop

The Start/Stop key controls serial communication between the plotter and the computer. When the communication line is open the LED will be green (Start mode). The LED turns red when communication is stopped (Stop mode). Plot files can only be sent to the plotter when communication line is open (green LED).

Power LED

The light emitting diode (LED) immediately above the Start Stop switch indicates the state of communication and provides error codes. LED error codes can be found in *Chapter 4* in the *LED Codes* section. The LED is red after power is turned on and the carriage resets. A red LED also indicates that the communication line is interrupted between the plotter and the computer. When communication in open between the plotter and the computer the LED will be green.

Rear Panel ON/OFF Control

The power on/off switch is located on the power cord entry module which is accessible on the back of the unit behind the keypad.

Control Center Software

The Control Center Software provides and interface that allows detailed changes to the Summit plotting parameters.

Screen Options

The main Control Center screen provides control over the primary plotting parameters. Any changes that are made must be sent as temporary or permanent settings before they take affect. Press the Start/Stop key and make sure the green LED (Start mode) is on before attempting to send any changes to the plotter.

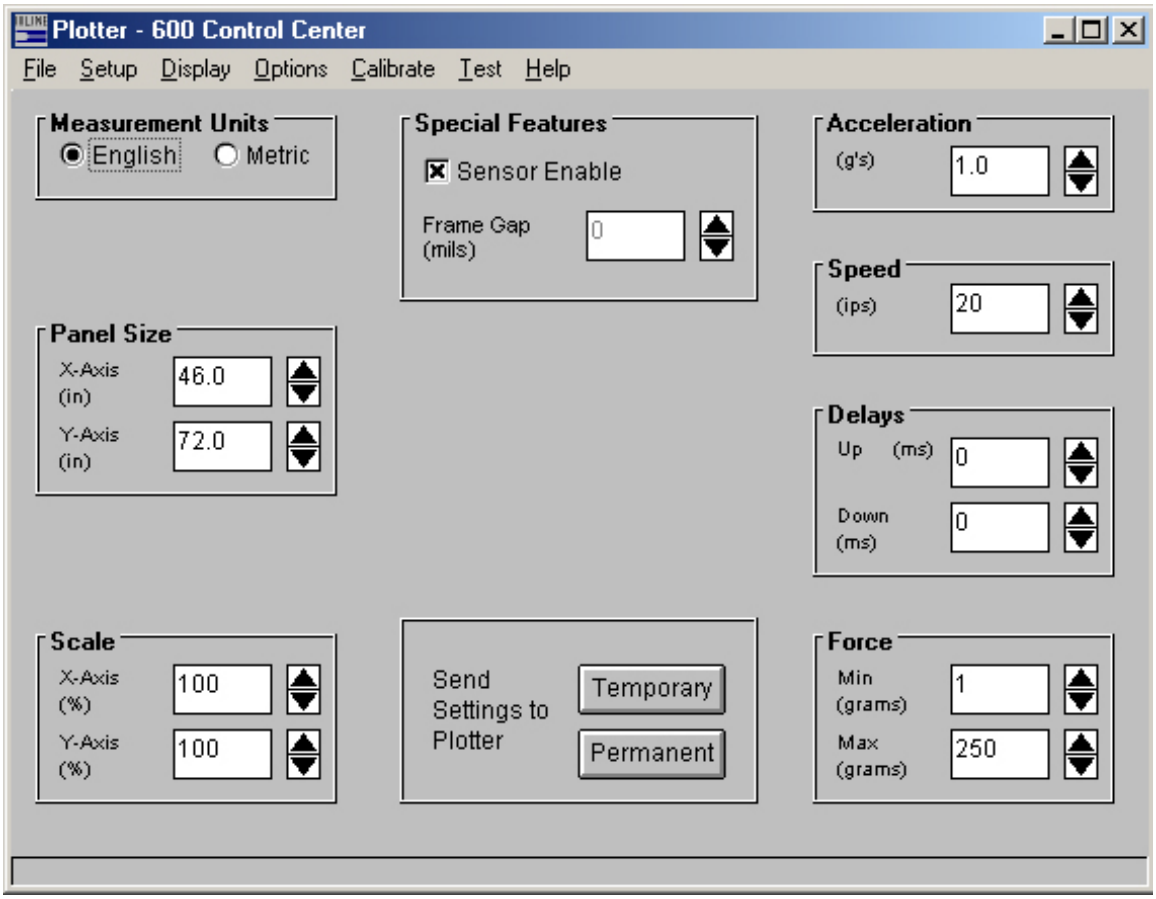


Figure 3-2. The Ioline Control Center Main Screen

Measurement Units

English or Metric unit systems may be used for length and speed settings.

Acceleration

The acceleration setting determines how quickly the pen will reach full speed when starting or ending a marker line. The factory default acceleration setting is 1.0 g (1 g = 32.2 ft/s^2). The setting range is 0.1 to 2.0 g.

Speed

Speed refers to pen and media speeds during plotting. Lower speed settings will improve the line quality but will reduce throughput. The factory default speed is 20 ips (inches per second). The setting range is 1 to 20 ips.

Up/Down Delays

Up/down delay controls how long the pen hesitates when actuated. Zero delay makes the pen rise instantly when line drawing is finished. By default it takes the pen 6 milliseconds to lower onto the paper when the logic powers the voice coil. Longer pen delay settings make the pen move more slowly but may improve the quality of the plotted line. The setting range is 0 to 250 ms (milliseconds).

Sensor Enable

The Sensor Enable check box provides the ability to turn off the frame sensor. This is useful to produce completed marker plots more rapidly with the P-600. Ioline recommends that the frame sensor be used for long markers because inter frame accuracy may be degraded without registration checking. Frame Gap settings (see below) can be used to correct X Axis misalignment when the frame sensor is disabled.

Frame Gap

Frame Gap will only affect plotting when the frame sensor is disabled.

Frame Gap affects the size of the X Axis gap between each plotted frame. Overlapping and separation that result from not using the frame sensor can be accounted for with frame gap adjustment. If the completed plot frames are overlapping, enter a positive number in the frame gap field. If there is too much space between completed plot frames enter a negative number in the frame gap field. To determine the necessary frame gap use the following procedure.

1. Turn off the frame sensor (refer to the Sensor Enable description above)
2. Send two consecutive marker plots to the P-600.
3. Measure the frame separation or overlap.
4. For a separation enter the measurement as a positive number in the frame gap field. For overlapping enter the measurement as a negative number in the frame gap field
5. With the plotter in Start mode (green LED) send the settings to the plotter with the Temporary or Permanent screen options.

HPGL Default

Your P-600 plotter supports three industry standard plotter languages; HPGL 7475, HPGL 7596, and DMPL. Your P-600 will automatically switch between DMPL and HPGL. The plotter cannot distinguish between HPGL 7475 and HPGL 7596 so the version number must be set in Control Center before a plot file is sent.

HPGL stands for Hewlett Packard Graphics Language and DMPL stand for Digital Microprocessor Plotter Language. HPGL 7475 is the default plotting language and is most common in the industry. It has a lower left origin which means the P-600 begins plotting from the lower left (keypad side) and measures everything from this location. HPGL 7596 uses a center origin and is much less common. A center origin means the P-600 begins plotting from the center of the panel and measures everything from this location.

Send Settings to P-600

When changes are made in the screen dialog boxes the plotter logic has to be updated via the serial link. Two options exist to make the changes take effect. Sending the settings with the Temporary button will replace the current plotter parameters until the power is turned off or new settings are sent from the control center. If the Permanent button is used to send the settings they remain in the plotter (even after the power is turned off) until they are changed from the Control Center.

Force

The Force settings control the maximum and minimum pen force that can be applied with the Force knob on the keypad. You can select a force setting range from 1 to 300 grams. The factory defaults are 50 grams minimum and 200 grams maximum. A narrow range of values allows fine adjustments to the pen force setting. A wide range of values allows coarse adjustments to the pen force.

Panel Size

The P-600 works with the apparel design software to create long markers by dividing them into smaller, more manageable frames. The P-600's default maximum frame size is 46 inches long by 72 inches wide.

Scale

By default the P-600 will produce a marker at 100% the size of the specified in the plot file (no scaling). If the X and Y scale is set to 50% the Summit will produce a marker that is half the specified size. You can set either or both the X and Y scaling of the plot from 1% to 999%.

Menu Bar Items

The menu items along the top of the screen allow adjustment of a variety of settings for computer control of the Ioline plotter. File management, plotter setup and serial port testing can all be accessed from the menu bar.

File

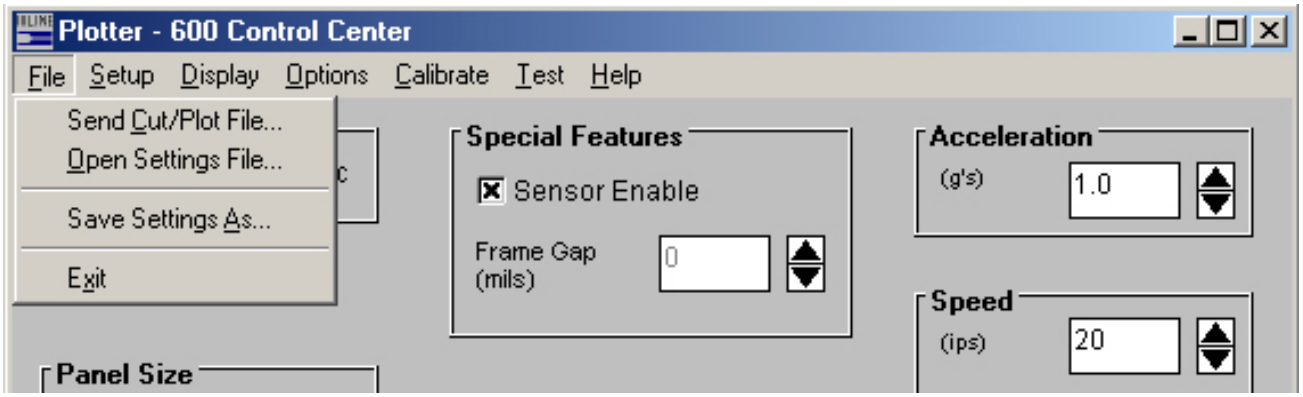


Figure 3-3. File Menu

Send Cut/Plot File
Use this option to send plot files (.plt format) to the P-600.

Open Settings File
Opens custom settings for the P-600 that have been stored with the *Save Settings As...* option below. When the P-600 is shut off these settings will be lost. The factory default settings will be in effect the next time the plotter is powered up.

Save Settings As...
Allows custom settings to be saved to a file so that they can be sent to the P-600 at a later time. To retrieve these files use *Send Settings File* explained above.

Setup

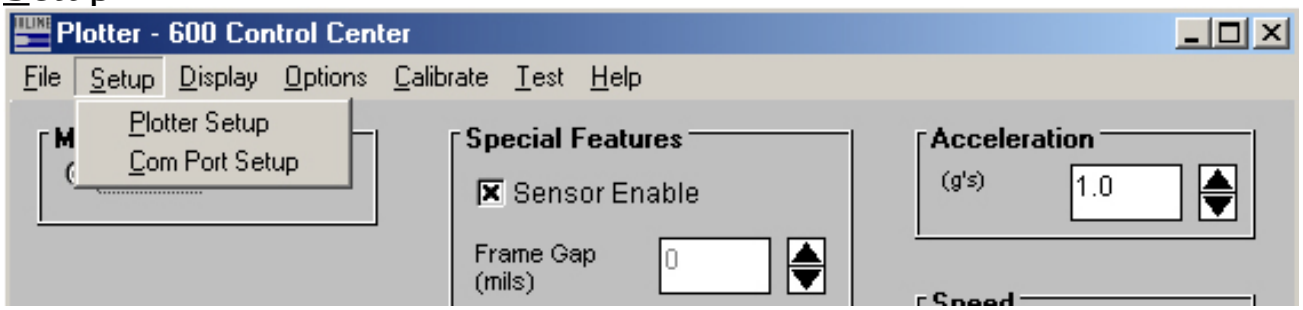


Figure 3-4. Setup Menu.

Plotter Setup
Allows selection of the plotter model and COM port.

Com Port Setup
Provides a list of COM ports to select from.

Display

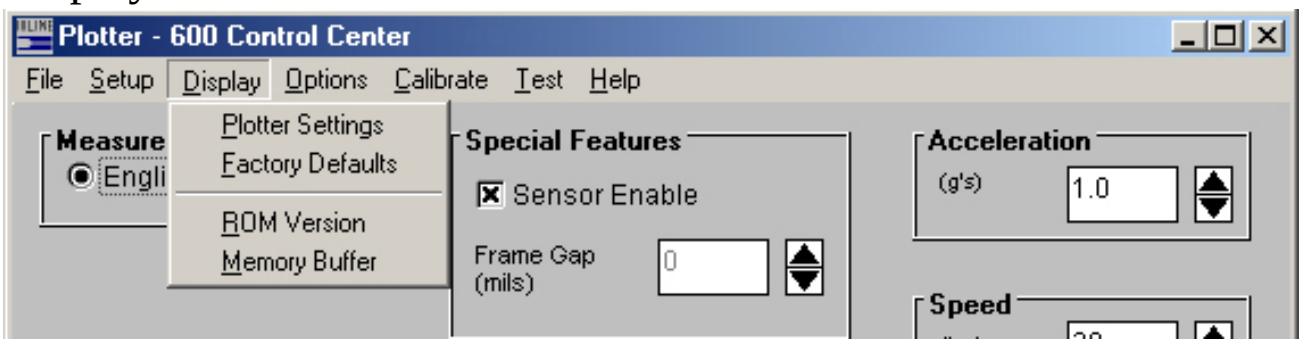


Figure 3-5. Display Menu.

Plotter Settings
Replaces all of the screen values with the current settings stored in the logic.

Factory Defaults
Replaces all of the screen values with the factory defaults. A dialog box will appear that allows these values to be sent to the plotter.

ROM Version
Displays the current ROM version installed in the plotter.

Memory Buffer
Displays the amount of buffer memory on the logic board. This value should be 12 K (kilobytes)

Calibration

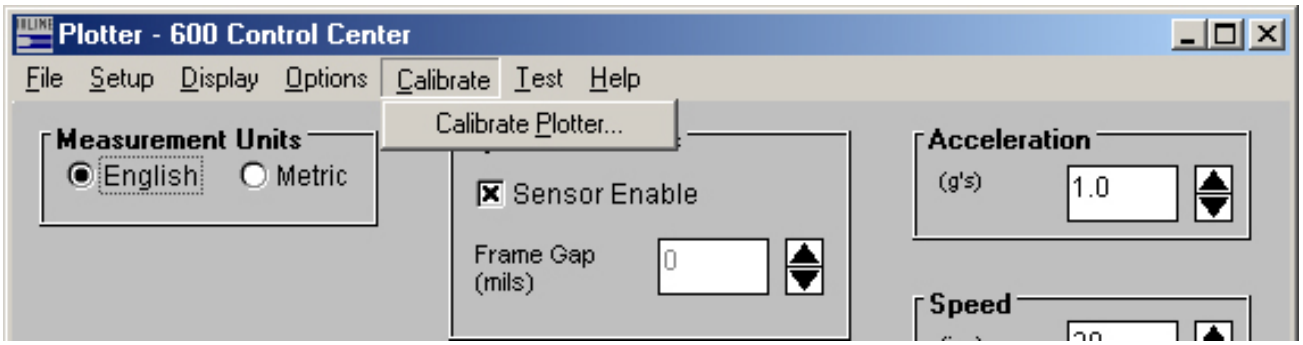


Figure 3-6. Calibrate Menu.

Calibrate Plotter
Provides methods to calibrate the plotter for maximum accuracy.

To calibrate the P-600:

Select *Calibrate*, *Calibrate Plotter* from the menu bar. A window like figure 3-7 will appear.

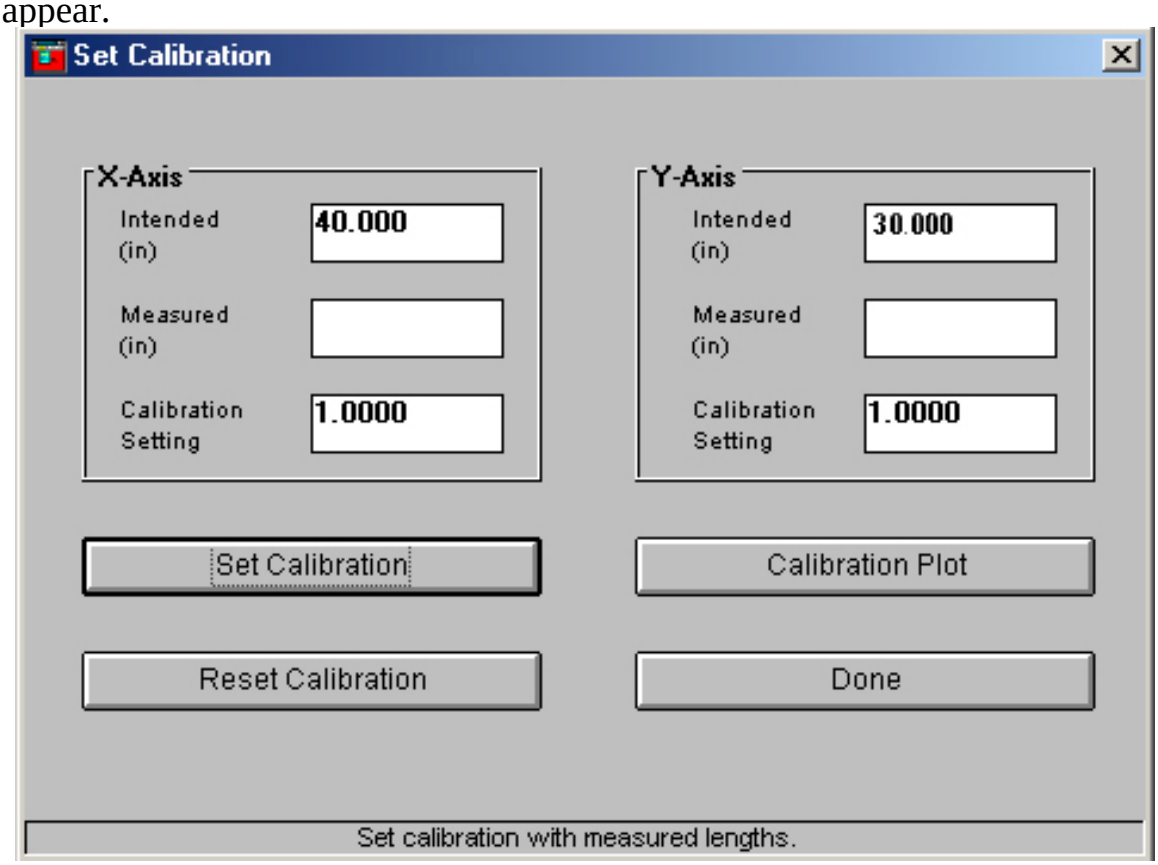


Figure 3-7. Calibration Screen.

Calibrating *(Cont...)*

1. Load the P-600 with paper making sure the paper is at least 41 inches long by 48 inches wide and that it is the type of paper used by the plotter most often.
2. Select *Calibration Plot.* The plotter will draw four ruled lines: 40 inches (101 cm), and 46 inches (116 cm) wide.
3. Precisely measure one length (X Axis) and one width line (Y Axis) in either inches or centimeters and record the results.
4. Select *Set Calibration*. Enter the measured X value. Enter the measured Y value.
5. Select *Set Calibration* again.
6. Select *Done*
7. Only use *Reset Calibration* to restore original factory calibration settings.

Test

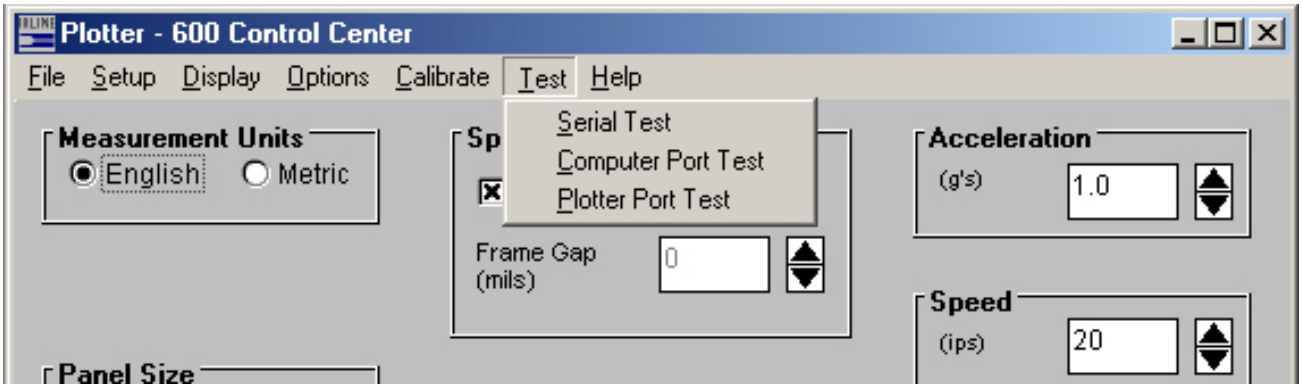


Figure 3-8. Test Menu.

Serial Test
Tests the serial connection between the plotter and the computer. See *Chapter 4, Communications Problems* for further information.

Computer Port Test.
Tests the serial port on the computer with a special tool available from Ioline. See *Chapter 4, Communications Problems* for further information.

Plotter Port Test.
Tests the serial port on the plotter with a special tool available from Ioline. See *Chapter 4, Communications Problems* for further information.

Help

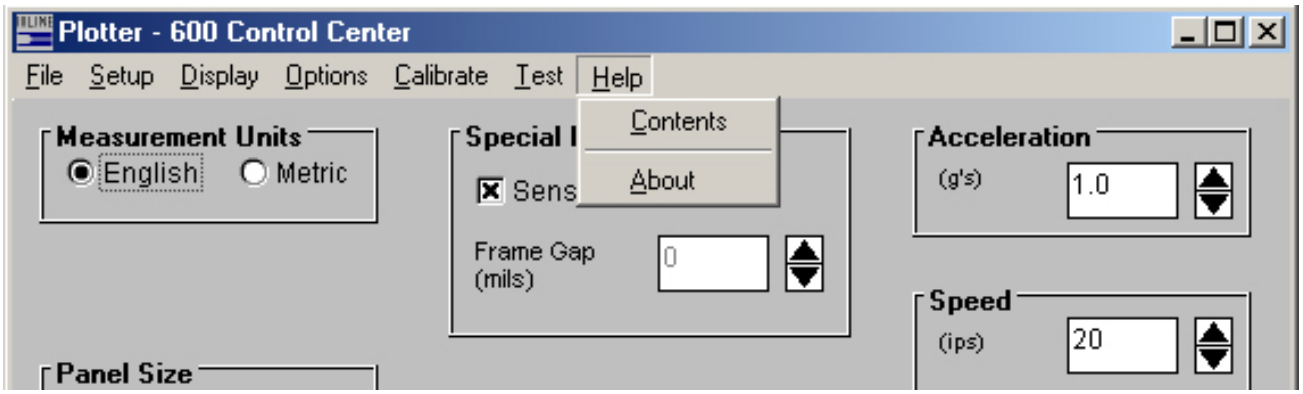


Figure 3-9. Help Menu.

Contents
Lists the contents of the help screen.

About
Provides revision information about the Ioline Control Center software.

Chapter 4 *Troubleshooting and Testing*

This section contains guidelines and testing procedures for resolving most plotting difficulties. Some of this information coincides with repair procedures located in Chapter 5. The following primary topics are explained and illustrated:

- Basic Operational Difficulties
- Mechanical, Electrical, and Electronic Diagnostic Processes
- Contacting Ioline Customer Service

Basic Operational Difficulties

If the system isn't working correctly it is very important to determine which component is causing the problem. Likely difficulties may involve the computer, the power cord or serial cable, the apparel/plot design software, or the P-600. If the problem appears to be with the computer or apparel design software consult the appropriate documentation or an Ioline dealer first.

The information in the following sections has been organized to eliminate minor problems with easy solutions first. If these remedies do not fix the problem more complex and invasive resolutions are provided. If a solution cannot be found in this manual or by changing the software and computer setup, fill out the D*iagnostic Record* at the end of this chapter and contact Ioline customer service.

Common Problems

Problem	Cause	Solution
A marker plot doesn't start at the correct point on the paper.	The starting point has not been set.	Press the Start Point Key with the pen positioned where the plot should start.
The P-600 does not complete the marker plot and leaves a large gap between frames.	The apparel design software frame size is set larger than the P-600's frame size setting (the factory set and maximum frame size is 46 inches).	Increase the P-600's frame size setting (from the Control Center) to match the setting of the apparel design software (or lower the apparel design software's frame size setting if it is larger than 46").
If a marker plot file has been sent but nothing happens.	A communication problem has occurred or the P-600 is in Stop (Red LED) mode.	Make sure the serial ports on the computer and the P-600 are configured properly. Press the Start/Stop key to put the P-600 in Start mode (green LED on).

Error Messages

Error messages that are specific to the P-600 are divided into two categories; software errors and LED codes. Software errors present themselves on the computer screen and usually indicate a communication problem. LED codes are visible below the keypad on the front panel of the P-600 and can be green, red or a combination of both. The LED code table in this section is for finding the cause of obvious external or communication problems. Later in the chapter a more comprehensive LED index is available for complex mechanical and electronic difficulties. Other errors can occur with the operating system or the plotting software and should be resolved with the software vendor.

Software Errors:

Error Message	Problem	Solution
Could not open COMx	The Control Center couldn't open the COM port for use. A serial port that is not available has been selected.	Select a serial port that is available.
Green LED Not ON or Plotter Not Connected to COMx	The Control Center opened the COM port but could not get a response from the plotter.	Be sure the plotter is connected to the selected serial port, that the plotter's green LED is on, and that the serial cable is functioning. Due to the nature of serial communication it is possible to get this message if an attempt is made to interact with the P-600 while it is plotting. If this is the case wait for the plot to finish and send the file again.
Setup Com Port and Check Plotter Present	The last operation requires that the plotter be connected to the serial port but the Control Center could not find it.	Be sure the plotter is connected to the selected serial port, that the P-600's green LED is on, and that the serial cable is functioning.
The plotter you have selected is not the same as that connected to your computer.	The Control Center cannot match the plotter that was chosen at start up with the one found during initialization.	Select the correct plotter from the plotter list.
This version of Control Center needs a ROM version of X.X or later.	The ROM is not compatible with the Control Center currently in use.	The plotter is shipped with a Control Center that is designed to function with specific ROM versions. If this error occurs contact Ioline to determine the correct ROM and software combination.

L.E.D Codes

LED Sequence	Problem	Solution
Continuous Beeping	· The frame sensor was unable to find the registration mark because of light ink or paper misalignment	- Press 'Sensor Test' to allow the frame sensor to try to find the mark again - Clean sensor lens with alcohol and a Q-Tip. - Press 'Start Point' to continue plotting without frame correction
3+ Second pause then repeat	- Buffer overflow - Communications problems - Defective RS-232 chip	- Perform communication tests as outlined below. - Send the marker.plt from the control center to verify communication integrity. - Replace RS-232 chip (U25).
3+ Second pause then repeat	- Frame advance size mismatch· - Outdated ROM version	- Change software frame advance size to match the "X" axis panel size - Check the ROM version to ensure it is 1.05 or greater, replace the ROM if is not.
Constantly Repeating	- Plotter language syntax error	- Make sure that the P-600 and the computer software are set to the same plotter language (HP-7475, HP-7596, DM/PL) - Send the marker.plt from the control center to verify communication integrity.
3+ Second pause then repeat	- Carriage ("Y" axis) or take up roll jam due to crumpled media or other objects blocking motion.	- Clear media or objects causin g the jam.
3+ Second pause then repeat	- Grit shaft ("X" axis) jam due to crumpled media or objects blocking motion.	- Clear media or objects causing the jam.

Legend	
	Solid GREEN Light Emitting Diode (LED)on the keypad
	Blinking GREEN Light Emitting Diode (LED) on the keypad
	Blinking RED Light Emitting Diode (LED) on the keypad

No Power When The P-600 is Turned On

If the P-600 does not initialize or the fan does not spin when the power is turned on there are a few simple steps to follow to determine if a serious problem has occurred.

1. Check the power cord. Make sure that it is firmly plugged into the wall and into the back of the plotter.
2. Check the voltage at the wall outlet and verify that it is within the operating limits as specified in *Chapter 1, Specifications*.

If there are no problems with the power to the P-600 proceed to the *Mechanical, Electrical, and Electronic Diagnostic Process* later in this chapter.

The P-600 Won't Respond to the Computer

If there is a problem getting the P-600 to accept commands from the computer, perform these procedures:

- Verify that the communications cable is correctly connected to the plotter and to the proper communications port on the computer.
- Check to see that the computer COM port that is being used is configured to match the P-600's serial COM port settings.
- Make certain that the marker file and the P-600 are set to the same plotter language.
- If the connection is good and the COM port assignments appear to be correct, proceed to the next section.

Communications Problems

Many plotting problems can be resolved by testing and adjusting the communications between the plotter and the computer. There are three diagnostic tests that can be run from the P-600 Control Center. These tests are designed to help determine if there are communications problems and isolate where the difficulty is occurring.

The last two tests require a diagnostic module (available from an Ioline dealer) connected to the serial port on the computer or the P-600. If the following tests do not resolve the problem and the computer and software are working properly, proceed to the Mechanical/ Electrical Diagnostic Process later in this chapter.

Serial Communication Test:

Run this test from the P-600 Control Center. The diagnostic module will NOT be needed to run this test.

1. Connect the serial ports on the P-600 and the computer with a serial cable.
2. From the P-600 Control Center screen, select ***Test***.
3. Select ***Serial Test***.
4. Turn on the P-600 while holding down the ***Sensor Test*** key on the keypad until the P-600 beeps and the LEDs flash three times.
5. Press the Start/Stop key on the keypad to verify that the handshake line (CTS), displayed on the computer, toggles ON and OFF. Leave the handshake lines ON. Press the roll feed down arrow key to switch the P-600 into ECHO mode. The green LED will come on.
6. Press any key on the computer and verify that the character transmitted equals the character received. If the P-600 and the computer pass all these tests there should not be any problems producing markers from plot files.
7. Select ***Exit*** after completing the serial test.
8. Turn off the P-600 at the end of the test. Normal communications will be re-stored when the power is turned back on.
9. If this test is successful the next two tests are not necessary.

Testing the P-600 Plotter Port:

Run this test from the P-600 Control Center. The diagnostic module WILL be needed to run this test.

1. Connect the diagnostic module directly to the P-600 serial port.
2. Turn on the P-600 while holding down the ***Sensor Test*** key on the keypad. Hold down the Sensor Test key until the P-600 beeps and LEDs flash three times.
3. Press any arrow key to transmit and receive characters. Verify the P-600 beeps and the green LED flashes.
4. Turn off the P-600 at the end of the test. Normal communications will be restored when the power is turned back on.

Testing the Computer Port:

Run this test from the P-600 Control Center. The diagnostic module WILL be needed to run this test.

1. Connect the diagnostic module directly to the serial port on the computer.
2. From the P-600 Control Center, select ***Test***.
3. Select ***Computer Port Test***.
4. Verify that the COM port displayed is the correct one. If it is not, press the ESC key twice and select the correct COM port from the Setup, COM Port Setup menu. If any key other than ESC is pressed the computer serial test screen will be displayed.
5. Press any key on the computer keyboard and verify that the character transmitted is the same as the character received.

Plotting Quality Problems

Good plotting quality is dependent upon a number of different factors. The type of paper, environmental conditions, and operator habits are only a few of the variables that can affect the quality of a plot. It is important that the P-600 is loaded and maintained according to the guidelines in the *P-600 User's Guide* and in Chapters 2 and 5. The table below is a summary of the most common difficulties:

Problem	Cause	Solution
If a marker plot file has been sent and the output is erratic.	The marker plot file was sent with the wrong plotter language setting	Make sure the apparel design software and the P-600 are set to the same plotter language (either HP7475 or HP7596).
If the frame sensor does not detect a frame axis mark (the P-600 stops functioning and emits audible beeps, and the keypad LED is green).	- The pen is dry .- The pen ink is not black. - The frame sensor is broken.	- Replace the pen. - Replace the pen with a new black ink pen and press the keypad sensor test key to perform the frame axis mark procedure again, or press the Start/Stop key to proceed to the next frame axis mark. - Press the Start/Stop key to proceed to the next frame axis mark and call Ioline Customer Service.
If the corners of the lines on the completed marker plots are not completely meeting.	- The paper is slipping - The up/down delay values are set incorrectly - The pen force setting is too low.	- Clean the grit shaft (refer to the Cleaning the Grit Shaft procedure). - Adjust the up/down delay values - Increase the pen force.

Regular or intermittent tearing:

Cause:

1. The pen is dry.
2. The pen tip is broken, possibly due to pen force set too high.
3. Dirt or debris is stuck on the pen.
4. The up/Down delay is set incorrectly.

Solution:

1. Replace the pen.
2. Decrease the pen force, and/or replace the pen.
3. Clear or replace the pen.
4. Reset the defaults in the Ioline Control Center.

Occasionally the paper will bubble during X axis movement and will cause the pen to snag. Check the grit shaft and chartwheels for unusual wear, debris, or damage.

Paper Tearing Under the Chartwheels:

Occasionally the paper will tear under the chartwheels during roll feed advance. This problem has been primarily traced to light paper usage. Large format plotting exerts higher than normal stresses on the media. Lighter weight paper has a tendency to fail when the torque of frame advance is applied. To solve this problem Ioline recommends that 35 lb. high quality paper be used for all large format plotting. If 35 lb. paper is not available the following suggestions may improve plotting performance:

- Add extra chartwheels to the square shaft. Removable chartwheels are available from Ioline.
- Ensure that the paper is loaded correctly every time a new plot is made. Higher quality paper is more forgiving of poor paper loading. See *Chapter 2* for the correct paper loading method.
- Check the *Loss Of Registration Between Frames* and *Tracking* sections below for suggestions to ensure that the paper path is functioning properly.

Loss of Registration Between Frames:

Loss of accuracy between the frames of the completed marker plots may indicate a loss of registration during frame advance. Check the following items to ensure that the P-600 is setup properly:

- Make sure the frame sensor is ON in the Control Center. If the frame sensor is OFF mark the check box and send settings to the plotter so that it functions properly.
- Registration problems may be able to corrected by reducing the speed and acceleration settings from the Control Center.
- The frame size may be mismatched between the P-600 and the apparel design software. Check that the frame size in the software is equal to or lower than the P-600 default of 46".
- Check the set screws on the timing belt pulleys to ensure that they are tight. This problem can cause registration loss because the axis lines are distorted.

Registration problems can also arise from the paper slipping under the chartwheels or from other tracking problems. If everything appears to be setup properly see *Tracking* below or contact Ioline Customer Service.

Tracking:

Tracking is the process that controls the media motion over the platen and assures accurate lines and frame matching. If the paper is slipping under the chartwheels or is misaligned, plotting quality and frame registration are degraded. To resolve tracking difficulties try the following suggestions:

- The paper must be installed correctly (see Chapter 2) so that it is taut and square.
- Check the take-up shaft to see if the roll of completed marker plots exceeds the height of the paper guide flanges. If the paper roll diameter is greater than the paper guide flanges the roll will have to be unwound before sending the next plot file.
- If the allen screws that hold the P-600 on the stand legs are over tightened the end plates can be bowed and binding can occur. Look for gaps between the end plates and the stand legs. Loosen the stand screws and tighten them until just before gap occurs.

Tracking: (Cont...)

- The paper may be sticking to a dirty platen. Inspect the platen and refer to the Cleaning section of Chapter 5 for further instructions.
- Make sure both pairs of the outermost chartwheels are at least six inches in from the edge of the paper. If the square shaft supports interfere with chartwheel alignment, reposition the paper roll near the center of the feed shaft.
- If the inner chartwheels are positioned over the bearings in the grit shaft paper tearing and bunching will occur. Check to ensure that this is not happening.
- Check to make sure that the P-600 is level. Use the bubble level included in the accessory kit. If it is not, level according to the instructions in Chapter 2.
- The chartwheel pressure on the grit shaft creates an impression on the marker plot. The underside of the completed marker plot will always have at least six visible grit tracks which should be identical. If one grit track is more pronounced or markedly different than the others there may be a chartwheel or grit shaft problem.
- The paper may be slipping because debris has accumulated on the grit shaft, preventing proper paper traction. Inspect and clean the grit shaft. Refer to the Cleaning section of Chapter 5 for further instructions.
- Contact Ioline Customer Service if damaged equipment is causing tracking difficulty or if the plotting quality problem cannot be resolved.

Poor Line Quality:

If the marker plot line quality is uneven try the following suggestions in order:

1. Use the keypad force knob to select a pen force that produces adequate line quality.
2. Replace the pen with a new one.
3. Adjust the plotting speed in the Control Center Software.
4. Plot on a higher quality paper.
5. Check that the pen is approved by Ioline.
6. Check the set screws on the timing belt pulleys to ensure that they are tight. This problem usually causes letters and lines to distort.
7. Contact Ioline Customer Service for further help.

Paper Alignment Procedure

Warning: This procedure uses a plot file to test the frame alignment of the paper. The plot file is made for 72" wide paper. If you have a smaller width paper, you must adjust the "Y" axis scale setting in the Ioline Control Center before running the plot file. (*A scale of 75% is usually good enough for 63" paper*). If this adjustment is not made before running the plot file, the pen could run off the left side of the paper and break.

1. Follow the paper loading instructions in the fIoline Model 600 & 28 Users guide.

- Ensure proper installation of the paper roll on the feed shaft.
- Ensure proper chartwheel placement

2. Position the pen where you want to start the marker and press "Start Point" on the keypad.

3. Click on the Ioline Control Center icon to start the Control Center program. (*Model P-600, 600H, and 600Ae: Disable the sensor by clicking on the "Sensor Enable" box under special Features. Then click "Temporary" at the bottom of the screen to send this change to the plotter. This is not necessary with models M-28, 28H, and 28Ae*).

4. Set the frame gap in the Control Center. The frame gap with vary depending on the size of the roll of paper you are using. The larger the roll, the larger the overlap. the smaller the roll the smaller the overlap. (*Model M-28, 28H, and 28Ae: The frame gap must be adjusted as the roll gets smaller to heighten accuracy during normal plotting*).

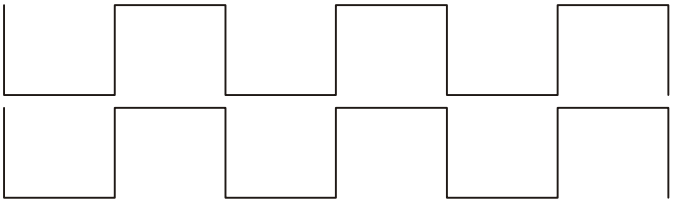
- Full Roll of paper: 130-150
- Half roll of paper: 100-130
- Close to end: 70-100

5. Click on the "Temporary" button in the Control Center to send the gap settings to the plotter.

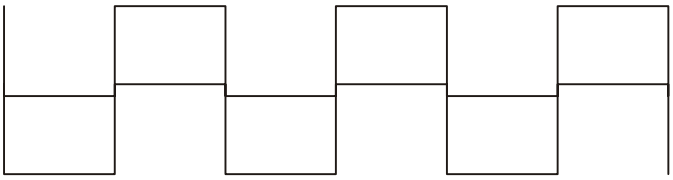
6. From the Control Center, click on “file” at the top left of the Control Center window. Then click on “Send plot file”. Send the **sqwave.plt** (Square Wave Plot), which Ioline has provided for this procedure. Allow the plot to complete one time (A total of 3 frames) so the paper feeding stabalizes. Run the file again. Roll the take-up shaft back (so the front dancer bar goes down). Look for the point where the frames make a cross and stop. Refer to the diagram below for adjustment of the frame gap, and rear bar.

7. After making your adjustments run the square wave plot again to ensure frame to frame accuracy.

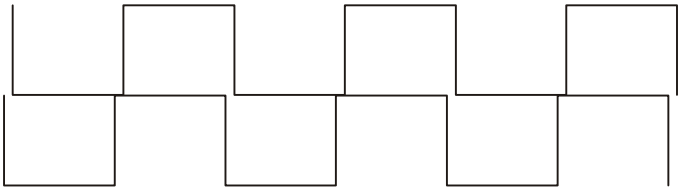
Frame gap number too high



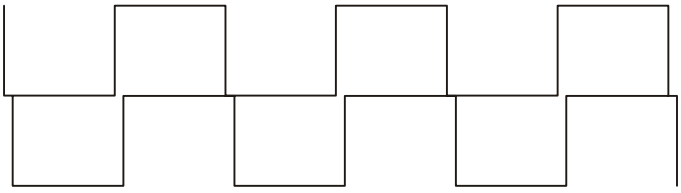
Frame gap number too low



Move back bar forward



Move back bar back



Mechanical, Electrical, and Electronic Diagnostic Process

The diagnostic processes that follow are detailed and invasive. Do not attempt to service the P-600 until it has been determined that simpler solutions (see above) will not resolve the problem. It is recommended that the sequence represented in the following diagram be followed when troubleshooting the P-600 Marker Plotter. Make sure to record the results of any diagnostic examination on the *Diagnostic Record* at the end of the chapter.

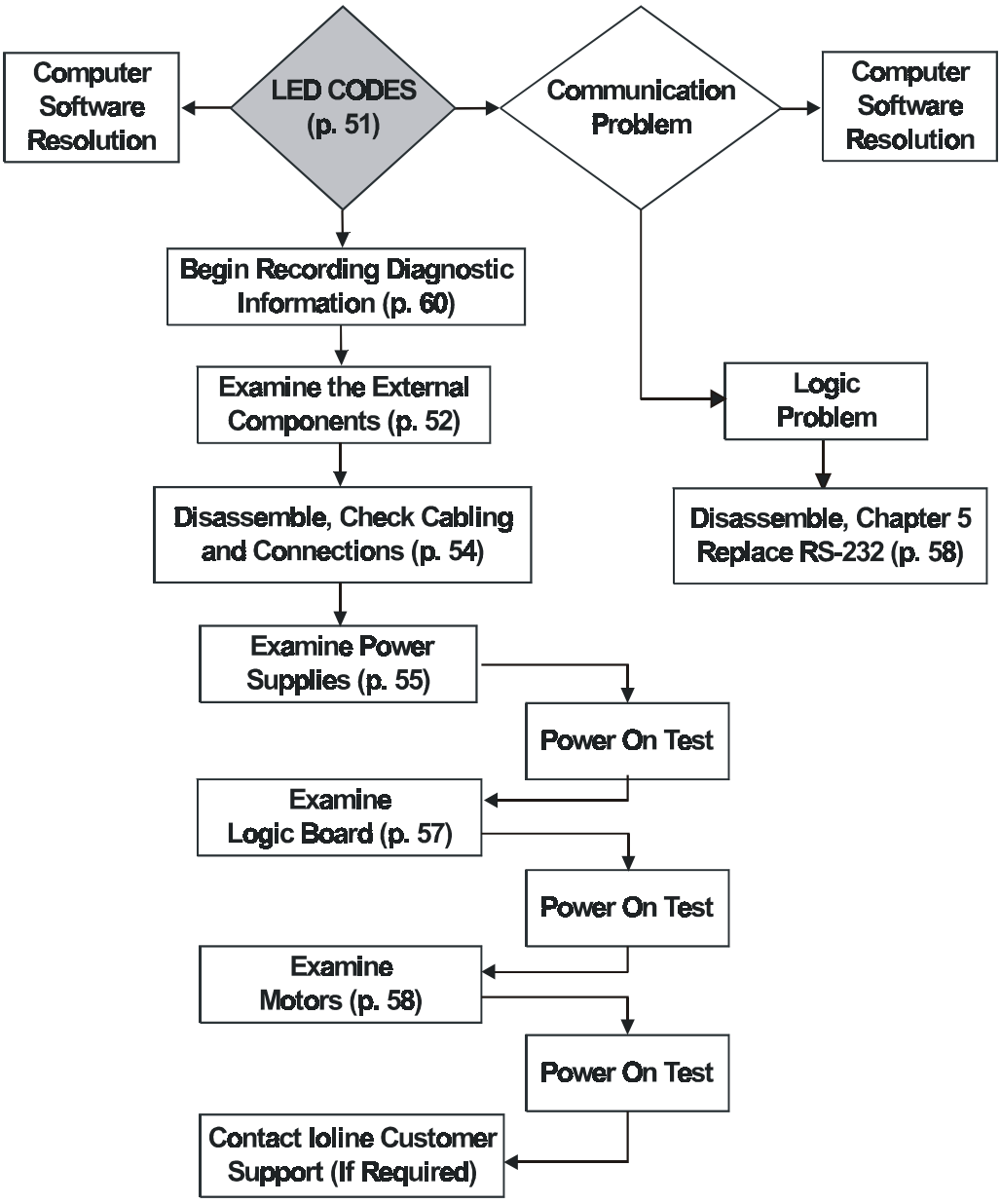

Computer Software Resolution
LED CODES (p. 51)
Communication Problem
Computer Software Resolution
Begin Recording Diagnostic Information (p. 60)
Examine the External Components (p. 52)
Logic Problem
Disassemble, Check Cabling and Connections (p. 54)
Disassemble, Chapter 5 Replace RS-232 (p. 58)
Examine Power Supplies (p. 55)
Power On Test
Examine Logic Board (p. 57)
Power On Test
Examine Motors (p. 58)
Power On Test
Contact Ioline Customer Support (If Required)

Figure 4-1. Mechanical, Electrical, and Electronic Diagnostic Flow Chart**.**

Expanded LED Codes

LED Sequence	Probable Causes	Solution

Dark or erratic flashing LED	- P-600 not plugged in
	- Cycling power supply due to:
	  - Incorrect power supply sequence or defective power supply
	  - Defective transistor(s) on logic board
	  - Short or other problem with motor
	- Defective power supply
	- Defective transistor(s) on logic board
	- Defective keypad
		- Plug unit into wall outlet
		- Check internally for damaged cabling and loose plugs
		- Test power supplies with fixture orresistor and replace if defective
		- Switch power supply input plugs (J3 and J7) on logic board
		- Replace defective transistor or entire logic board
		- Replace keypad

3+ Second pause then repeat	- Carriage (Y axis) or roll feed jam due to:
	  - Media or mechanical jam
	  - Transmission failure
	  - Defective power supply
	  - Defective transistor(s) on logic board
	  - Defective motor encoder
	  - Short or other problem with motor
		- Clear media causing jam
		- Clear mechanical jam
		- Check internally for damaged cabling and loose plugs
		- Test power supplies with fixture or resistor and replace if defective
		- Replace defective transistor or entire logic board
		- Replace defective motor

3+ Second pause then repeat	- Grit Shaft (X axis) jam due to:
	  - Media or mechanical jam
	  - Defective transistor(s) on logic board
	  - Defective power supply
	  - Defective motor encoder
	  - Short or other problem with motor
		- Clear media causing jam
		- Clear mechanical jam
		- Check internally for damaged cabling and loose plugs
		- Test power supplies with fixture or resistor and replace if defective
		- Replace defective transistor or entire logic board
		- Replace defective motor

Less than 2 second pause then repeat	- Cycling power supply due to:
	  - Incorrect power supply sequence or defective power supply
	  - Defective transistor(s) on logic board
	  - Short or other problem with motor
		- Check internally for damaged cabling and loose plugs
		- Test power supplies with fixture or resistor and replace if defective
		- Switch power supply input plugs (J3 and J7) on logic board
		- Replace defective transistor or entire logic board
		- Replace defective motor

Legend	
	Blinking GREEN Light Emitting Diode (LED) on the keypad
	Blinking RED Light Emitting Diode (LED) on the keypad

External Inspection

Use these procedures if:

- The P-600 did not initialize (dark LED, fan not running, carriage did not move or made small jerking movements at power on) after it was unpacked from the box and setup following the procedure outlined in the *P-600 User's Guide* or in *Chapter 2*.
- The P-600 has been working but did not initialize after being reset by turning the power off then on.
- Jam messages occur without media or other objects obstructing normal operation.
- The carriage is making loud or unusual sounds.

Required Tools:

- Multimeter capable of reading AC voltage.
- Phillips head screw driver.
- Allen wrenches: 1/16" and 5/64".
- Nut driver or socket wrench with extension: 11/32".

Inspect the Outside of the Unit:

1. Turn the plotter off.
2. Inspect the unit for damage or obvious signs of mechanical malfunction.
3. Measure the voltage at the wall outlet to verify that it is between 100 and 250 VAC.
4. Clear all media paths and ensure that nothing is obstructing the movement of the front take up roller.
5. Move the carriage from side to side by hand. If the carriage resists easy movement then a short is probably present on the logic board or in the motor. Follow the disassembly procedures in *Chapter 5, General Disassembly Procedures* then consult *Testing the Logic Board* and *Testing the Motors* later in this chapter.

Perform the following disassembly:

1. Unplug the power cord from the wall outlet and the serial cable from the computer.
2. Remove the plastic end covers from the end plates following the procedures outlined in *Chapter 5*.

3. Rotate the front take-up roller and pull the take up shaft out of the support blocks.
4. Remove all media and the rear paper roll.

Front Roller Motor Key:

With the take-up shaft off the machine, inspect the square block that turns the roller. The key should be tight and should not rotate easily. If it does, tighten the HEX screw located in the hole on one end of the block.

Carriage (Y Axis) Transmission :

1. Turn the power off.
2. Make sure that the carriage (Y axis) transmission belts are not damaged, mistracking or loose. Closely check the belt teeth for excessive wear.
3. Loosen the transmission retaining nuts (there are four) with the 11/32" nut driver and re-tighten them.
4. Tighten the allen set screws on the pulleys with the 1/16" and 5/64" allen wrenches.
5. Ensure that the three allen screws (5/64" allen wrench) holding the motor to the transmission bracket are not loose.
6. Actuate the transmission by depressing the left and right keypad arrows with the power on. Test both directions for at least 5 seconds.
7. If unusual noises or mechanical malfunctions are present remove the transmission and return it to Ioline for a replacement.

If these procedures are not effective read *Internal Cabling and Connection Inspection* for the next step in the diagnostic process.

Internal Cabling and Connection Inspection

WARNING

- ***The P-600 is very heavy and could cause an injury if it falls. Make sure that another person assists with moving the plotter to and from the stand and that it is held while not connected to the stand.***
- ***When the bottom cover of the plotter is removed and the power is on there is an electric shock hazard. These diagnostic procedures should only be performed by qualified technical personnel or individuals that are aware of safe practices with 110 VAC and 220 VAC devices.***

Do not lift the P-600/M-28 by its top dust cover or traverse assembly. Use the bottom surfaces of the end plates for lifting and moving the plotter.

Use this procedure if:

- The procedures in *External Inspection* did not resolve the difficulty.

Tools Required:

- Phillips head screw driver.
- 5/32" allen wrench (supplied).
- Two people capable of lifting 100 pounds each.
- Grounding strap (optional).

Initial Internal Inspection:

1. Fully disassemble the P-600 as described in *Chapter 5, General Disassembly Procedures.*
2. Many components in the P-600 are sensitive to static discharge. Make sure that any static electricity is discharged before attempting any service procedures. A grounding wrist strap works the best and can be provided by Ioline on request.
3. Inspect all of the connectors on the power supply, logic board and at the motors to determine if anything came loose during shipping or from rough handling. Gently push on all plugs and socketed logic chips to ensure that they are properly seated.
4. If a SIMM is present at U27, remove it.

5. The P-600 will operate lying on it's back so long as there are no obstructions to the motion of the carriage, grit shaft and front roller**.**

WARNING

When the plotter is connected to a wall outlet there are high voltages on the power supplies that could cause an injury. Be extremely careful!

6. Plug the plotter back into the wall and turn it on. Check to see if the plotter resets.

If these procedures are not effective in solving the problem continue to *Testing the Power Supplies* for the next step in the diagnostic process.

Testing Power Supplies

Use this procedure if:

- The procedures in the *Internal Cabling and Connection Inspection* did not resolve the difficulty.

Tools Required:

- Multimeter capable of reading DC voltage.
- Power Supply test fixture (available from Ioline) or one 20W, 5W resistor with long (6 cm or more) leads.
- Soldering apparatus (optional).
- Insulating material (electrical tape, mylar strips, etc.)

Inspect the Fuse and Output Terminals:

1. Turn the power off.
2. Inspect the onboard power supply fuse. If it is defective it can be replaced with a 3/4" x 3/16", 3 AMP, GFE, fast blow fuse or equivalent.
3. Examine the metal terminals at the +24 V, +5 V and ground output wires. The insulation for these wires is colored red for +5 V, yellow for +24 V, and black or brown for ground. They should be flush against the board and unable to touch each other.
4. If it looks like they could short or if arcing has occurred, re-solder as necessary and/or insulate the wires so that they can no longer contact each other.
5. The power supply may also be returned to Ioline for a replacement.

If this does not isolate a power supply problem continue to the next step.

Test the Power Supply Output Voltage:

1. Turn the power off.
2. Mark the power supply connectors with their associated socket number (J3 or J7).
3. Unplug both power supplies from the logic board. It is very important that they be disconnected from the logic board for correct voltage readings.
4. Connect one of the power supplies to the Ioline Power Supply Test Fixture *. The plug will only fit on one way.

* If the Ioline test fixture is not available insert a 20W, 5W resistor into the plug between one of the red (+5V) wires and one of the black or brown ground wires. The voltages are labeled on the logic board at the J3 and J7 connectors.

5. The fixture provides labeled test points for all output voltages. Turn the power on and measure the voltages. All of them should be tested relative to the associated ground pin (the +5 V shares a common ground) and should read as labeled (± 10%). Repeat this procedure for the other power supply.
6. If any voltage fluctuates wildly or is not within 10% of the specified value then replace the power supply. If the voltages are within the tolerances continue to the next step.

Swap Power Supply Connections:

1. Turn the power off.
2. Swap the power supply connectors (J3 and J7) so that the plug that was connected at J3 is now connected and J7 and the connector at J7 is connected at J3.
3. Turn on the power and determine if the problem is gone i.e. the carriage resets and gives a steady red LED on the keypad.
4. If there was a jam and it seems to have been cleared test all motions with the arrow keys letting the motors run for ten seconds or so.
5. If the problem is resolved then the power supplies were starting in the wrong sequence and should now work correctly.

If these procedures are not effective in solving the problem read *Testing the Logic Board* for the next step in the diagnostic process.

Reference Information for the Power Supply Test Fixture:

The information below describes the resistive loads imposed on the power supply when the Ioline Power Supply Test Fixture is used. While not as effective, a 20w, 5W resistor between +5V (red) and ground (black or brown) will also work for testing.

- R_{5vload} = 20 w, 3 watt (I_{5vload} @ 250 ma)
- $R_{12vload}$ = 500 w, 1/2 watt (use 2 X 1Kw res. for $I_{+12vload}$ @ 24 ma)
- $R_{-12vload}$ = 500 w, 1/2 watt (use 2 X 1K w for $I_{-12vload}$ @ 24 ma)
- $R_{24vload}$ = 1 K w,1/2 watt (use 2 X 2Kw 1/4 watt resistor for $I_{24vload}$ @ 24 ma)
- All load resistors should be within a ± 20% tolerance

Testing the Logic Board

Use this procedure if:

- The procedures in *Testing the Power Supplies* did not resolve the difficulty.
- The carriage was difficult to move during external inspection.

Tools Required:

- Phillips head screw driver.
- Multimeter capable of reading resistance in Ohms (W).
- Soldering apparatus and grounding strap (both optional).

Testing the FETs (Transistors):

1. Turn the power off. Discharge any static electricity as described above.
2. Find the motor power transistors (FETs) on the logic board. They are located near the power input plugs J3 and J7 and are labeled Q1-Q8 and Q10-Q11.
3. If any of FETs have melted, smell acrid or burnt, or have discolored the logic board they should be replaced.
4. Using a multimeter test the resistance between the source (S) and drain (D) leads and between the gate (G) and drain (D) leads on each of the transistors.
5. If any of the resistance measurements are less than 500 kW the part is suspect. If any readings are below 1 W there is an internal short and a definite FET failure.
6. If the FETs are defective and the logic board is revision 0 the entire board should be replaced with the newest version. If the logic board is revision 1 the defective FETs can be replaced with exact duplicates The transistors at locations Q1, Q3, Q5, Q7, and Q10 are p-channel FETs and can be replaced with Ioline part number 105858. The transistors Q2, Q4, Q6, Q8, and Q11 are n-channel FETs and require Ioline part number 102807 for replacement.
7. If replacing a FET is not possible remove and replace the entire logic board.
8. Before the plotter is re-tested with a new logic board and/or new transistors make sure that any media or mechanical jams have been cleared so that the FETs are not damaged in the same manner that might have caused their original failure. Also ensure that the ROM version is 1.05 or greater.

Testing and Replacing the Other Logic Components (Including the RS-232):

1. If all of the other diagnostic procedures have been exhausted and the FETs are testing good, change the logic board. Communications problems may indicate that the RS-232 chip may need to be replaced. This socketed component is located at U25. No other logic board components can be field tested.

If these procedures are not effective in solving the problem read *Testing the Motors* for the next step in the diagnostic process.

Testing the Motors

Use this procedure if:

- The procedures in *Testing the Logic Board* did not resolve the difficulty.

Tools Required:

- Phillips head screw driver.
- Allen wrenches: 1/16", 5/64".

Initial Motor Inspection:

1. Rotate the grit shaft and front roller and move the carriage while listening to the associated motor.
2. If there is any grinding, squeaking, or clicking from within the motor it is probably defective. Return the motor to Ioline for a replacement.

Likely Modes of Motor Failure:

1. *An internal short has occurred.* This malfunction exhibits itself as a jam and causes the motor to be more difficult to turn by hand. To determine if a carriage motor has shorted, unplug the input power leads and move the carriage by hand. If the motion has a high resistance the motor is probably shorted. The front roller and grit shaft cannot be tested this way due to the nature of the transmissions. If these motors are suspect they will have to be removed and tested at Ioline.

The motor encoder has failed. The encoder allows the plotter logic to keep track of axis positions and speeds. When an encoder fails the motor may work at low speeds but during acceleration it speeds up abnormally then jams.

Grit Shaft (X Axis) Motor Replacement:

If the grit shaft quickly accelerates and jams and the FETs are not defective, or if unexplainable X axis jams occur the motor may be defective. See *Chapter 5, X-Axis Motor Replacement* section for the replacement procedure.

Carriage (Y Axis) Motor Replacement:

If the carriage quickly accelerates and jams and the FETs are not defective or if unexplainable jams occur the motor may be defective. See *Chapter 5, Y-Axis Motor Replacement* section for the replacement procedure.

Roll Feed Motor Replacement:

If the front roller quickly accelerates and jams and the FETs are not defective, or if unexplainable jams occur the motor may be defective. See *Chapter 5, Take-Up Motor Replacement* section for the replacement procedure.

Testing the New Motor:

1. Test the new motor(s) with the keypad arrow keys for five to ten seconds.
2. It is important that care be taken when changing the motor and that proper belt tensions and alignment be attained after the new unit is installed. Never separate the motor and encoder assembly.
3. If replacing and adjusting the motor cannot be accurately accomplished contact a qualified service dealer or Ioline customer service for assistance.

If the difficulty persists and the *Diagnostic Record* (see below) is completed, contact an Ioline dealer Ioline Customer Service for further help.

Contacting Ioline Customer Service

If the suggestions and guidelines in this manual cannot help resolve the difficulty contact Ioline Customer Service. When speaking with a customer service representative they will ask a number of questions regarding the results of the diagnostic investigation. Use the following form to record the observations so Ioline can expedite solving the difficulties.

Diagnostic Record

- What is the serial number for this unit? _____ Logic board revision # ? _____
- Who was the dealer that sold it to you? _____
- Has the unit been working properly up to the point of the recent failure?
  YES_____ NO_____
- Are there any blinking LEDs or beeping sounds associated with this problem?
  YES_____ NO_____
  If yes, please describe them. _____
- Were there communication or computer software problems?
  If yes, please describe them. _____
- When the plotter is first turned on, does the pen carriage move fully to the right?
  YES_____ NO_____
- Does the fan come on? YES_____ NO_____
- With the power off, slide the carriage from side-to-side.
  - Does the carriage slide easily to each side? YES_____ NO_____
  - Is there more resistance to move the carriage to the left _____, the right _____, or is it equal? _____
- Was a SIMM installed at U27 on the logic board? YES_____ NO_____
- Were all of the cable connections securely fastened to the logic board.
  YES_____ NO_____
- Were all logic components seated in the logic board. YES_____ NO_____
- Were the power supplies shorting at the terminals? YES_____ NO_____
- Were the power supply voltages within the tolerances? YES_____ NO_____
- Record the power supply voltage readings here:

J3, VMOT(+24V)_____	J7, VMOT(+24V)_____
J3, +12V_____	J7, +12V_____
J3, -12V_____	J7, -12V_____
J3, +5 (1)_____	J7, +5 (1)_____
J3, +5 (2)_____	J7, +5 (2)_____

- Were any of the transistors on the logic board defective? YES_____ NO_____
  If yes, which ones?
  Q1___ Q2___ Q3___ Q4___ Q5___ Q6___ Q7___ Q8___ Q9___ Q10___ Q11___
- Were any of the motors or encoders bad?
  If yes, which ones? X motor/encoder__ Y motor/encoder__ Roll Feed motor/encoder__
- Please list any other difficulties. Be very specific about the nature of the problem and any symptoms associated with it.

Re-Packing the P-600

If the P-600 must be returned to Ioline for repair it must be shipped in the original packaging supplied with the plotter. To repackage the P-600 use the plotter Packing Assembly Diagram in the Appendix. Contact Ioline Customer Service for shipping instructions.

Chapter 5 Repair and Maintenance

This section contains instructions for replacing failed assemblies and maintaining the P-600. The testing procedures for determining if an assembly is causing difficulties are located in Chapter 4. The following subsystems and procedures are explained and illustrated:

- Cleaning and Regular Maintenance
- General Disassembly Procedures
- Y-Axis Subsystem
- X-Axis Subsystem
- Take Up Shaft and Feed Shaft Subsystems
- Electrical Subsystem
- Electronic Subsystem

List Of Recommended Tools And Equipment

All of the tools and equipment that are needed to perform the repair and adjustment procedures are listed below:

1. Number 2 Phillips magnetic head screwdriver
2. Precision Pull Scale 1 kg x 20 g (36 oz x 1/2 oz)
3. 9/64”, 5/64”, 5/32” (supplied), 1/16”, and 1/8” Hex Wrenches
4. Socket Wrench Driver
5. 9” Socket Wrench Extension
6. 3/8” Socket or Nut Driver
7. 11/32” Socket
8. 11/32”, 1/2”, and 9/16” Open End Wrenches
9. Torque Driver w/ in lbs (inch pound) Scale
10. Exacto knife
11. Double back tape
12. Needle nose pliers
13. Volt/Ohm Meter
14. Static Grounding Strap (supplied on request)
15. Ioline Power Supply Test Fixture (available from Ioline)
16. Ioline Serial Port Test Fixture (available from Ioline)
17. Plastic Cable Ties

Cleaning And Regular Maintenance

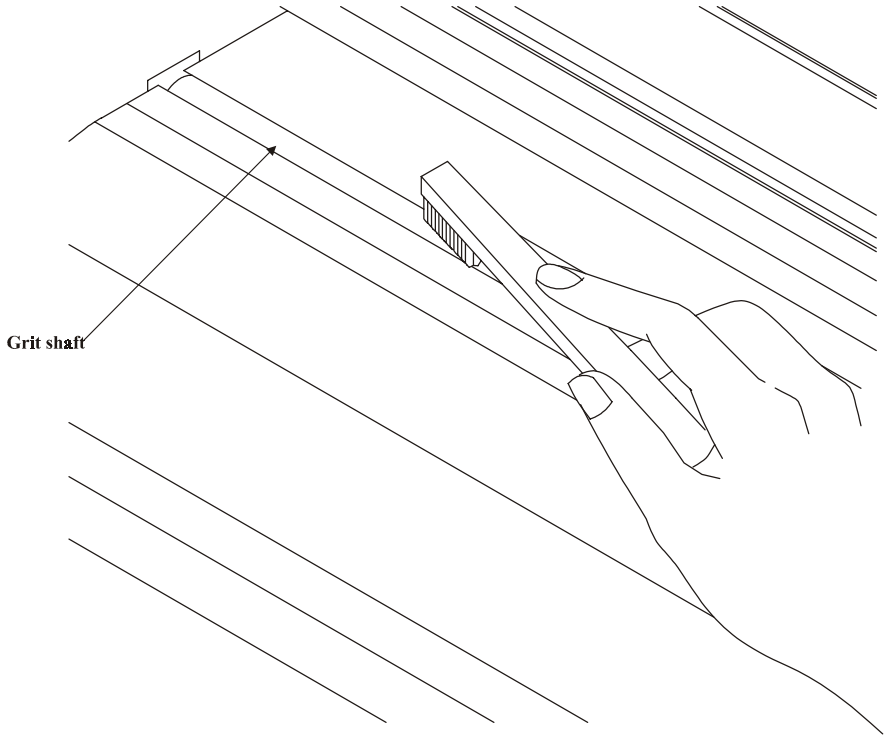
The following preventive maintenance procedures should be performed as required. The dust cover may have to be removed before some of these procedures can be accomplished.

Cleaning The Grit Shaft

Note: Any dust and paper residue that accumulates on the grit shaft or under the chartwheels can cause the grit shaft to lose contact with the paper which may result in a loss of registration or poor tracking.

Clean the grit shaft regularly to make sure the P-600 continues to draw accurate marker plots.

1. Turn off the P-600.
2. Remove the paper from the platen.
3. Using the grit shaft cleaning brush, remove any accumulated dust and paper residue from the grit shaft.



Cleaning The Platen

During use the P-600 will accumulate dust and paper residue on the platen. This debris may have to be removed as often as every two weeks. Clean the platen by wiping with an isopropyl (pharmacy) alcohol dampened, lint-free cloth. Commercially available antistatic spray instead may be used instead of isopropyl alcohol.

1. Turn off the P-600.
2. Dampen a lint-free cloth with isopropyl (pharmacy) alcohol and gently wipe the platen until any accumulated residue has been removed. Antistatic spray may be used instead of isopropyl alcohol.

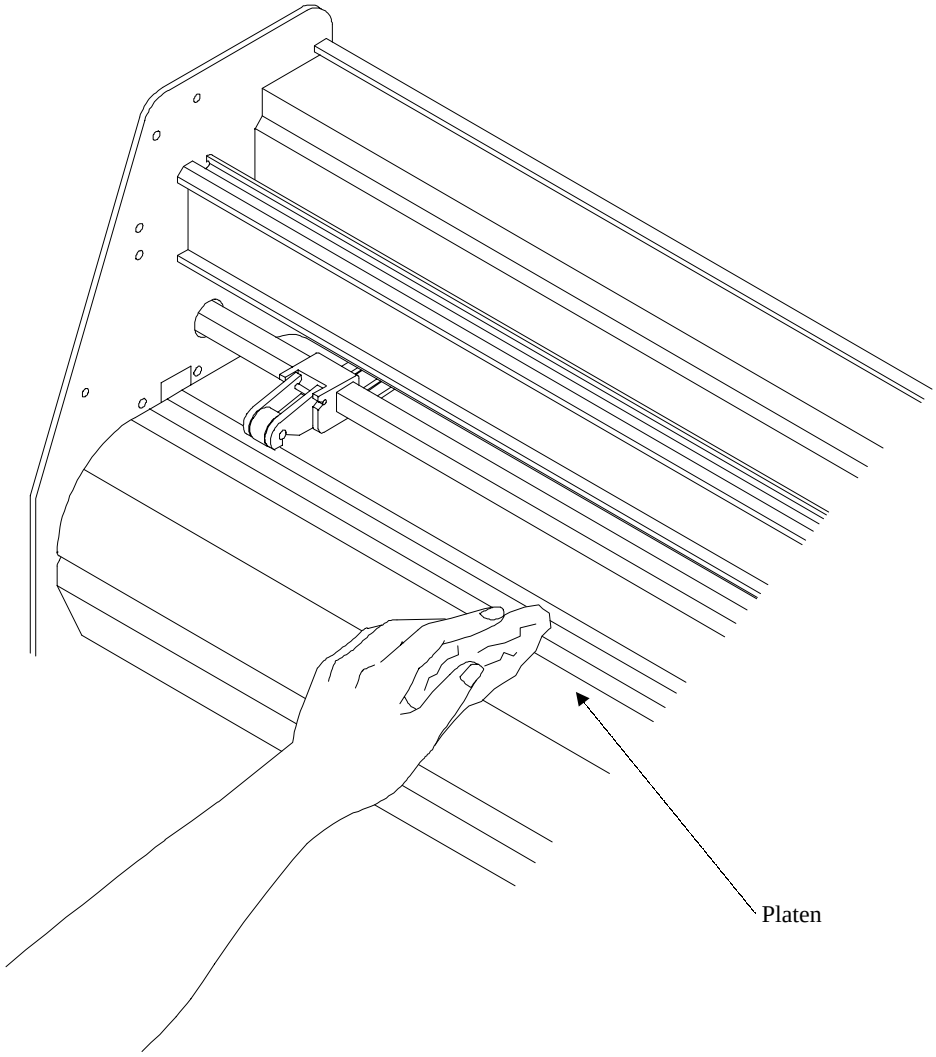


Figure 5-2. Cleaning the Platen

Cleaning The Support Blocks

Dust and paper residue will accumulate on the support blocks. Clean the support blocks by wiping them off with an isopropyl (pharmacy) alcohol dampened, lint-free cloth.

1. Turn off the P-600.
2. Remove the feed shaft and the take-up shaft.
3. Dampen a lint-free cloth with isopropyl (pharmacy) alcohol and gently wipe the support blocks until any accumulated residue has been removed.
4. Wipe down the ends of the feed shaft and the take-up shaft before reinstalling them.

Note: The remaining preventive maintenance procedures require the removal of the dust cover. Use the *Removing the Dust Cover* procedure in the *General Disassembly* section that follows.

Cleaning the Traverse Extrusion and Carriage V-Wheels

As dust and debris accumulate on the traverse extrusion it will have to be wiped off with an isopropyl (pharmacy) alcohol dampened, lint-free cloth.

1. Remove the dust cover if it is still installed (refer to *Removing The Dust Cover* procedure above).
2. Dampen a lint-free cloth with isopropyl (pharmacy) alcohol and gently wipe the top and bottom rails of the traverse extrusion until any accumulated dust and debris has been removed.
3. Carefully lift the ribbon cable from the groove. Do not unplug the ribbon cable. Gently wipe the ribbon cable groove and remove any accumulated dust and debris.
4. Clean the carriage v-wheels by holding an isopropyl alcohol dampened lint-free cloth against a v-wheel while gently sliding the carriage back and forth. Repeat this procedure for each of the v-wheels.
5. Reinstall the dust cover.

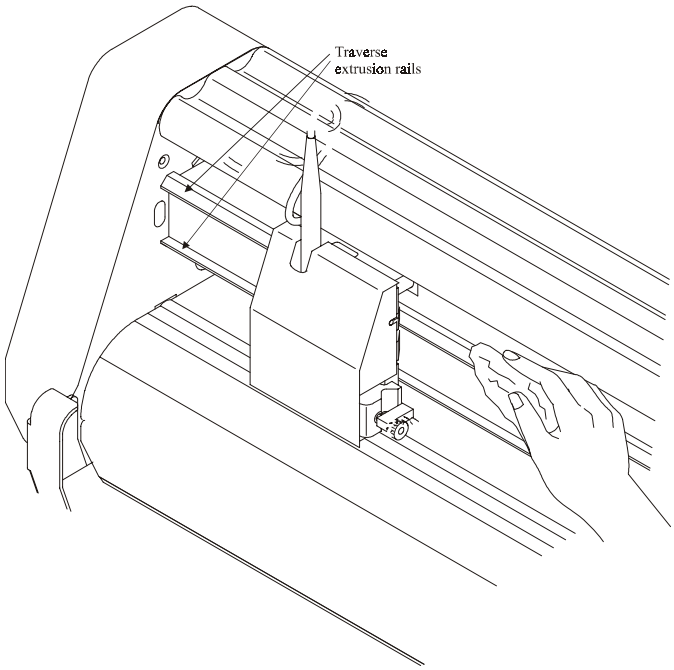


Figure 5-3. Cleaning the Traverse Extrusion and Carriage V-Wheels

General Disassembly Procedures

The following procedures describe the basic disassembly of the P-600 to gain access to the carriage, logic, power, and drive components. Please pay close attention to the Warning and Caution notes.

Removing the End Covers and Dust Cover

1. Turn off the P-600 and unplug the serial and power cables.
2. If the take-up shaft is loaded on the support blocks remove them and set them aside.
3. Remove the two black phillips head screws, and the two silver phillips head screws on the bottom of the cover, then remove the right cover. See figure 5-4 below.
4. Remove the two black phillips head screws, and the two silver phillips head screws on the bottom that hold the left cover on the P-600 then remove the left cover. See figure 5-4 below.
5. Use a screw driver to remove the two dust cover screws, one from each end of the P-600. Make sure to only remove the two dust cover screws (refer to figures 5-4 through 5-6).
6. Remove the dust cover.

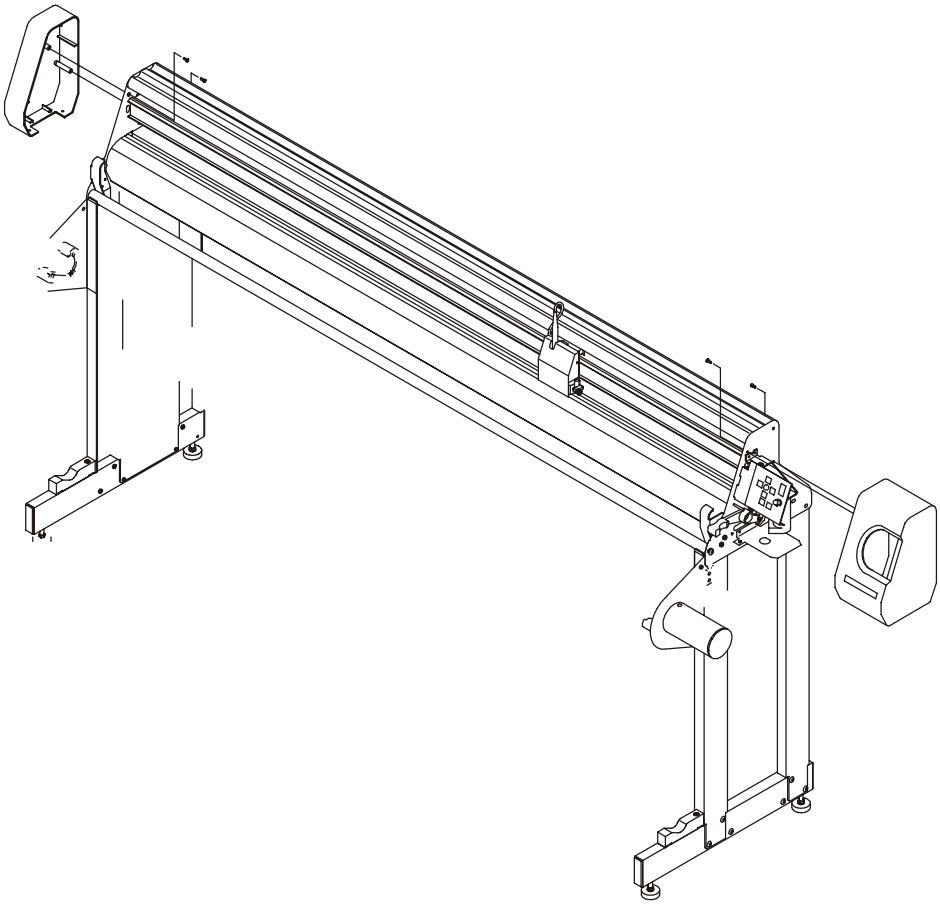


Figure 5-4. Removing the End Covers and the Dust Cover

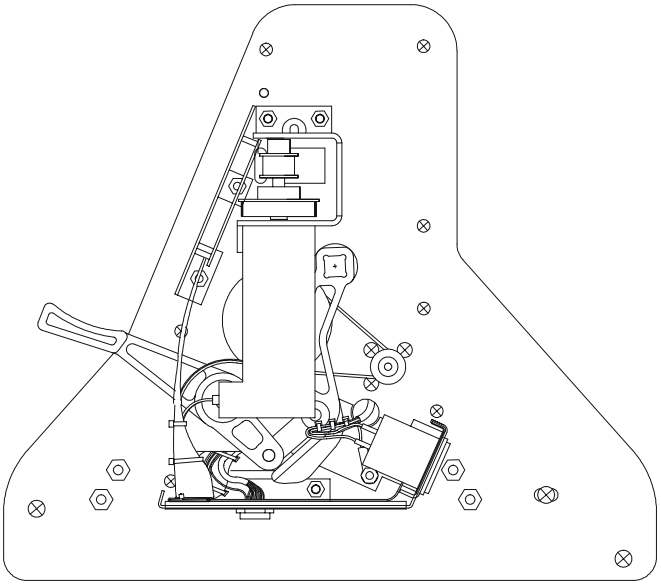


Figure 5-5. Right End With Cover Removed.

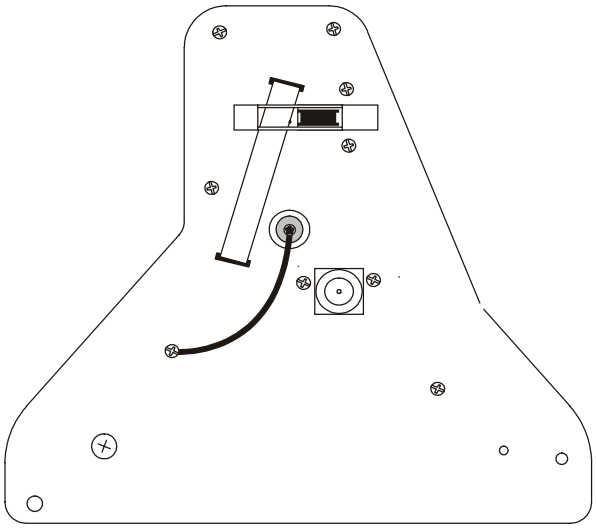


Figure 5-6. Left End With Cover Removed.

Removing the Bottom Cover for Internal Access

WARNING

- ***The Summit P-600/M-28 is very heavy and could cause an injury if it falls. Make sure that another person assists with moving the plotter to and from the stand and that it is held while not connected to the stand.***
- ***When the bottom cover of the P-600 is removed and the power is on there is an electric shock hazard. These diagnostic procedures should only be performed by qualified technical personnel or individuals that are aware of safe practices with 110 VAC and 220 VAC devices.***

Do not lift the P-600 by its top dust cover or traverse assembly. Use the bottom surfaces of the end plates for lifting and moving the plotter.

Tools Required:

- Phillips head screw driver.
- 5/32” allen wrench (supplied).
- Two people capable of lifting 100 pounds each.
- Grounding strap (optional).

Perform the Following Disassembly:

1. Remove the two allen head screws (5/32” allen wrench) holding the rear of the P-600 on the stand.

2. Lift the plotter forward, rotating it from the back until it rests on the front resting screws.
3. Remove the six phillips screws that retain the bottom cover (including the ones in the center of the covers).
4. Open the bottom cover a few centimeters and carefully unplug the fans from the logic board. Do not touch any of the logic components.
5. Remove the bottom cover.

Y Axis Subsystem

CARRIAGE

Carriage Replacement:

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left (4 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Remove the carriage cover by loosening the three HEX head screws. There are two on the left side, and one on the right side. Once the screws are loose, pull the cover towards you.
4. Loosen the allen screw on the belt tensioner (left side of the machine) until the screw is not exposed. Do not remove the screw.
5. With a pair of needle nosed pliers grasp one of the metal "T"-connectors on the end of the Y Axis belt and pull it out and toward the center of the carriage until it pops free. Make sure that the tensioner assembly is not tangled in the belt. Remove the other end of the belt.
6. Remove the carriage from the machine by pushing down on the top, and pulling out the bottom wheels.
7. Mount the new carriage on the traverse extrusion by aligning the upper wheel with the upper rail, push down on the carriage, then slip the lower wheels onto the bottom rail and let the carriage rest.
8. Insert one of the metal "T"-connectors into the grooves on the front of the carriage body. With a pair of needle nosed pliers grasp the other "T"-connector and slip into the grooves. This operation may require a strong pulling force.
9. Align the tensioner assembly with the indentations on the end plate and apply light tension to the belt by tightening the allen screw.
10. Move the carriage to the far right.
11. Adjust the belt tension by tightening the belt tensioner until the spring scale measurement at the center with the belt pulled 1" out from the normal position is 320 +/-20 grams.

12. Plug the power cord into the P-600 and into a wall outlet. Move the carriage back and forth across the traverse extrusion with the keypad keys while watching the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32" nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.
13. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
14. If problems arise contact Ioline customer service.

Replacing the Carriage Ribbon Cable:

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left (4 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Disconnect the ribbon cable from the carriage by sliding the rectangular locking collar away from the socket. The collar is fragile so be very careful when loosening it.
5. Gently pull the ribbon cable out of the channel. A piece of two sided foam tape holds the cable on the channel bottom so do not pull hard. Feed the cable through the top slot in the end plate. Another piece of foam tape holds the ribbon cable to the end plate so take care in removing the ribbon cable from the slot.
6. Discharge any static electricity that has accumulated and remove all of the plugs and connections on the power supplies. Use the *Interconnect Diagram* in the *Appendix* section as a location guide.
7. Remove the power supplies (2 screws in the removable metal pan) by loosening the phillips head screws and pulling the units out of the track in the platen.
8. Disconnect the ribbon cable from the logic board by sliding the rectangular locking collar away from the socket. The collar is fragile so be very careful when loosening it.
9. Feed the ribbon cable out of the plastic retainers on the underside of the platen and through bottom slot in the end plate.
10. Feed the new ribbon cable through bottom slot in the end plate and into the plastic retainers on the underside of the platen. Make sure that the exposed metal

leads face up (toward the bottom of the platen).

11. Connect the ribbon cable to the logic board by inserting the cable into the rectangular connector until it stops (the locking collar must be pulled out). Make sure that the exposed metal leads face up (toward the bottom of the platen). Slide the locking collar toward the socket until it snaps shut. The collar is fragile so be very careful when closing it.
12. Replace the power supplies using the chassis assembly diagrams in the *Appendix* as a guide. Connect all of the plugs using the *Interconnect Diagram* in the *Appendix* section.
13. Rotate the P-600 back so that it is in normal operating position. Feed the ribbon cable through the top slot in the end plate. The exposed metal leads should face up toward the top of the plotter. Make sure that the cable is stuck to the foam tape on the end plate.
14. Gently pull the ribbon cable taut and press it onto the two sided foam tape on the channel bottom.
15. Connect the ribbon cable to the carriage by inserting the cable into the rectangular connector until it stops (the locking collar must be pulled out). Make sure that the exposed metal leads face down (toward the bottom of the channel). Slide the locking collar toward the socket until it snaps shut. The collar is fragile so be very careful when closing it.
16. Plug the power cord into the P-600 and into a wall outlet. Move the carriage back and forth with the keypad keys while watching the ribbon cable in the track. If the cable snags in the channel check for proper alignment where the cable is stuck to the foam tape.
17. Reconnect the serial cable and perform test plots. If the carriage does not function check that the cable is oriented correctly in the rectangular connectors. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
18. If problems arise contact Ioline customer service.

Frame Sensor Adjustment:

The frame sensor does not typically require any adjustment once it is set at the factory. If the sensor does not read the mark, or the sensor looks to be too high, or too low, then slight adjustment may be required.

1. The bottom of the wand should be approximately 2.8mm (.017”) from the bottom of the sensor to the paper (This is the thickness of two pennies). If this measure

ment is not correct, loosen the clamp screw on the bracket.

2. Place 2 pennies (stacked) on the paper just under the frame sensor, and lower the sensor until it rests on the pennies. Lift up on the sensor a little (So you can get the pennies out), and tighten the screw to hold the sensor. Remove the pennies.
2. Turn the P-600 off then on so that the carriage is positioned near the keypad side of the machine. Press Sensor Test on the keypad.
3. If the measurement is correct you should hear a "Beep" each time the sensor passes over the marks on the paper. If you don't hear the beeps, then (while the sensor test is still going) loosen the set screw that holds the sensor, and gently move it up and down until you hear the beep. Don't forget to tighten the sensor set screw.

Transmission

Y-Axis Transmission Assembly Replacement:

Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left (4 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Loosen the allen screw on the belt tensioner until the screw is not exposed. Do not remove the screw.
4. With a pair of needle nosed pliers grasp one of the metal "T"-connectors on the end of the Y-Axis belt and pull it out and toward the center of the carriage until it pops free. Make sure that the tensioner assembly is not tangled in the belt. Remove the other end of the belt from the carriage.
5. Pull the Y Axis belt through the holes in the right end plate. The belt may have to be threaded through the pulleys in the Y Axis transmission.
6. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
7. Discharge any static electricity that has accumulated and remove the Y Axis encoder plug from the logic board. The plug is located at J10 on the right side of the board. Never separate the motor and encoder.
8. Rotate the P-600 so that it is in normal operating position. Carefully cut the

cable ties that surround the wire bundle that contains the encoder wire. Feed the wire and plug through the access hole. The plug may need to be bent flat to accomplish this.

9. Disconnect the motor power cables (Red and black) from the base of the motor.
10. Loosen and remove the four 11/32" nuts that hold the Y Axis transmission onto the end plate.
11. Install the new transmission on the end plate with the motor body pointing down. Secure the assembly with the 11/32" nuts from the previous step.
12. Reconnect the encoder cable at J10. The P-600 will have to be rotated back to expose the bottom of the machine for this operation. Reconnect the power cables to the base of the motor with the red wire attached at 1 and the black wire attached at 2.
13. Thread the Y Axis belt through the access slots in the end plate and around the empty pulley in the transmission. It is very important to make sure that there are no twists in the belt and that the belt teeth properly engage the pulley.
14. Insert one of the metal "T"-connectors into the grooves on the back of the carriage body. With a pair of needle nosed pliers grasp the other "T"-connector and slip into the grooves. This operation may require a strong pulling force.
15. Align the tensioner assembly with the indentations on the end plate and apply light tension to the belt by tightening the allen screw.
16. Move the carriage to the far right.
17. Adjust the belt tension by tightening the belt tensioner until the spring scale measurement at the center with the belt pulled 1" out from the normal position is 320 +/-20 grams.
18. Plug the power cord into the P-600 and into a wall outlet. Move the carriage back and forth across the traverse extrusion with the keypad keys while watching the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32" nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.
19. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
20. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
21. If problems arise contact Ioline customer service.

Y Axis Motor Replacement:

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left (4 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Discharge any static electricity that has accumulated and remove the Y Axis encoder plug from the logic board. The plug is located at J10 on the right side of the board. Never separate the motor and encoder.
5. Rotate the plotter back so that it is in normal operating position. Carefully cut the cable ties that surround the wire bundle that contains the encoder wire. Feed the wire and plug through the access hole. The plug may need to be bent flat to accomplish this.
6. Disconnect the motor power cables (Red and black) from the base of the motor.
7. Loosen the allen set screws (1/16" allen wrench) in the pulley and pull it off of the shaft. It may be difficult to remove because the set screws are glued into place and they cause small burrs on the shaft when tight.
8. Remove the allen head screws (5/64" allen wrench) that retain the motor.
9. Remove and replace the motor assembly. Make sure that the belt and pulley teeth are aligned when pushing the pulley onto the motor shaft. Reuse the set screws from the old pulley because they have Loctite residue on the threads.
10. When reinstalling the pulley make sure that one set screw contacts the shaft on the flat machined surface.
11. Reconnect the encoder cable at J10. The Summit will have to be rolled onto the back for this operation. Reconnect the power cables to the base of the motor with the red wire attached at 1 and the black wire attached at 2. Use cable ties to rewrap the encoder cables and ribbon cables securely together.
12. Plug the power cord into the P-600 and into a wall outlet. Move the carriage back and forth across the traverse extrusion with the keypad keys while watching the Y Axis transmission belt. If there is excessive noise or if the belt is loose the allen head screws (5/64" allen wrench) that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
13. Cable tie the wire bundles together to ensure that they do not interfere with movement

of parts and end cover replacement.

14. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
15. If problems arise contact Ioline customer service.

Y-Axis Belt Replacement:

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left (4 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Loosen the allen screw on the belt tensioner until the screw is not exposed. Do not remove the screw.
4. With a pair of needle nosed pliers grasp one of the metal "T"-connectors on the end of the Y-Axis belt and pull it out and toward the center of the carriage until it pops free. Make sure that the tensioner assembly is not tangled in the belt. Remove the other end of the belt from the carriage.
5. Pull the Y Axis belt through the holes in the left end plate. The belt will have to be threaded through the tensioner assembly. Once the belt is removed the tensioner assembly will have to be set aside because it is not attached to the end plate.
6. Pull the Y Axis belt through the holes in the right end plate. The belt may have to be threaded through the pulleys in the Y Axis transmission.
7. Thread the new Y Axis belt through the access slots in the right end plate and around the empty pulley in the transmission (The easiest way to thread the belt through the traverse is to first thread a tape measure through, and tape the new belt to the tape measure). It is very important to make sure that there are no twists in the belt and that the belt teeth properly engage the pulley. Continue to thread the belt through the holes in the left end plate and through the belt tensioner. Make sure that the belt teeth face the pulley wheel and that there are still no twists.
8. Insert one of the metal "T"-connectors into the grooves on the back of the carriage body. With a pair of needle nosed pliers grasp the other "T"-connector and slip into the grooves. This operation may require a strong pulling force.
9. Align the tensioner assembly with the indentations on the end plate and apply light tension to the belt by tightening the allen screw.

10. Move the carriage to the far right.
11. Adjust the belt tension by tightening the belt tensioner until the spring scale measurement at the center with the belt pulled 1” out from the normal position is 320 +/-20 grams.
12. Plug the power cord into the P-600 and into a wall outlet. Move the carriage back and forth across the traverse extrusion with the keypad keys while watching the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32” nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.
13. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
14. If problems arise contact Ioline customer service.

X Axis Subsystem

Transmission

X-Axis Transmission Assembly Replacement:

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. It is important to note that the X Axis transmission consists of two pulleys and a motor. There is no assembly to replace but the components can be changed if necessary.
2. Shut off the plotter and remove the power and serial cables.
3. Remove the right (4 screws) and left end covers (4 screws). See *Removing the End Covers and Dust Cover* above.
4. To replace either pulley or the timing belt the chartwheel lever must be removed. Loosen and remove the allen screw with a 5/32” hex wrench, the nylock nuts with a 3/8” nut driver, and the set screw in the lever body with a 5/64” hex wrench. Then remove the spring. Pull the lever off the end plate and set it aside. Make sure that the metal spacer under chartwheel lever is retained for re-assembly.
5. To change either pulley loosen the set screws, pull the pulley off and replace with a new part. Reuse the set screws from the old pulley because they have

Loctite residue on the threads. When tightening the set screws in the motor pulley make sure that one set screw contacts the shaft on the flat machined surface.

6. Reattach the chartwheel lever. Make sure that the chartwheels are oriented properly with respect the lever position and that the set screw in the lever body is tightened.
7. Plug the power cord into the P-600 and into a wall outlet. Move the grit shaft back and forth with the keypad keys while watching the X Axis belt. If there is excessive noise or if the belt is loose the phillips head screws that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
8. If the motor needs to be changed use the procedure below.
9. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.

If problems arise contact Ioline customer service.

X Axis Motor Replacement:

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left end covers (4 screws). See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Discharge any static electricity that has accumulated and remove all of the plugs on the logic board. Use the *Interconnect Diagram* in the *Appendix* section to find all of the connections.
5. Remove the logic board by loosening the phillips head screws and pulling the unit out of the track in the platen.
6. Disconnect the motor power cables (Red and black) from the base of the motor.
7. Remove the motor pulley and belt. This operation can be accomplished with the chartwheel lever in place but the lever assembly can be removed as described in the above procedure. Loosen and remove the three phillips head screws that hold the motor on the end plate.
8. Replace the motor and attach the pulley and belt. When tightening the set screws make sure that one set screw contacts the shaft on the flat machined surface.
9. Reconnect the power cables to the base of the motor with the red wire attached at

1 and the black wire attached at 2. Make sure to route the wiring through the plastic clips so that it is held away from moving parts and is accessible after the logic board is installed.
10. Install the logic board making sure that the rear edge fits into the proper track in the platen. Secure with the phillips screws.
11. Connect all of the plugs on the logic board. Use the *Interconnect Diagram* in the *Appendix* section to properly make all of the connections.
12. Plug the power cord into the P-600 and into a wall outlet. Move the grit shaft back and forth with the keypad keys while watching the X Axis belt. If there is excessive noise or if the belt is loose the phillips head screws that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
13. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
14. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.

If problems arise contact Ioline customer service.

Square Shaft and Chartwheel Assembly Replacement

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left end covers (4 screws). See *Removing the End Covers and Dust Cover* above.
3. To remove the chartwheel lever, loosen and remove the allen screw with a 5/32" hex wrench, the nylock nuts with a 3/8" nut driver, and the set screw in the lever body with a 5/64" hex wrench. Then remove the spring. Pull the lever off the end plate and set it aside. Make sure that the metal spacer under chartwheel lever is retained for re-assembly.
4. Loosen and remove the allen screw on the left end plate with a 5/32" hex wrench. Loosen the set screws in the square shaft support bushings with a 1/16" hex wrench.
5. Gently pull the square shaft out of the support brackets toward the left end plate. The chart wheels and support bushings will probably fall out.
6. If a chart wheel needs to be replaced remove the defective unit and install a new part. Insert the old square shaft as outlined below for a new square shaft.
7. Gently slide in new square shaft. As the shaft is inserted the chart wheels and

support bushings will have to be placed on the shaft. Use the assembly diagrams in the Appendix section to get the correct order and orientation. Make sure that the support bushings are inserted into the square shaft supports and that the set screw is facing toward the front of the plotter so that they can be tightened after the square shaft is in place.

8. Attach the chartwheel lever and make sure that the chartwheels are oriented properly with respect to the lever position and that the set screw in the lever body is tightened.
9. Insert and tighten the square shaft allen screw and cap in the left end plate.
10. Plug the power cord into the P-600 and into a wall outlet. With the chartwheel lever down, move the grit shaft back and forth with the keypad keys while watching the chartwheels and square shaft. If there is excessive noise check the set screws and other hardware to be sure it is tight.
11. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.

If problems arise contact Ioline customer service.

Grit Shaft Assembly Replacement

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) and left (4 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Loosen the allen screw on the belt tensioner until the screw is not exposed. Do not remove the screw.
4. With a pair of needle nosed pliers grasp one of the metal “T”-connectors on the end of the Y-Axis belt and pull it out and toward the center of the carriage until it pops free. Remove the other end of the belt from the carriage.
5. Pull the Y Axis belt through the holes in the right end plate. The belt may have to be threaded through the pulleys in the Y Axis transmission.
6. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
7. Discharge any static electricity that has accumulated and remove all of the plugs and connections on the logic board and power supplies. Use the *Interconnect*

Diagram in the *Appendix* section as a location guide.

8. Remove the logic board (four screws) and power supplies (2 screws in the removable metal pan) by loosening the phillips head screws and pulling the units out of the track in the platen.
9. Rotate the P-600 so that it is in normal operating position. Carefully cut the cable ties that surround the wire bundle that contains the Y Axis encoder wire. Feed the wire and plug through the access hole. The plug may need to be bent flat to accomplish this.
10. Disconnect the motor power cables (Red and black) from the base of the motor.
11. Loosen and remove the four 11/32" nuts that hold the Y Axis transmission onto the end plate. Remove the Y Axis transmission and set it aside.
12. Remove the chartwheel lever assembly as described above in *X-Axis Transmission Assembly Replacement*.
13. Loosen but DO NOT remove the phillips head screws securing the X Axis motor. Push the motor assembly toward the grit shaft pulley until the belt is loose. Remove the belt.
14. Now rotate the machine back to the forward position to gain access to the bottom.
15. Loosen the allen screws securing the grit shaft.
16. Slide the old grit shaft out in the direction of the keypad.
17. Install new bearing clips on new grit shaft bearings.
18. Gently slide in new grit shaft. When the grit shaft is inserted far enough the grit shaft pulley will be 1/8" from the end plate and will rotate freely. Some minor squeezing may be necessary to feed the bearing clips into the platen. Using a torque driver with a 5/32" hex bit tighten the screws securing the grit shaft to 6 in lbs.
19. Place the X axis belt on the grit shaft pulley then loop the belt over the motor pulley. Pull the motor pulley away from the grit shaft pulley until the belt is tight but not strained then tighten the phillips screws that hold motor onto the end plate.
20. Replace the power supplies and logic board using the chassis assembly diagrams in the *Appendix* as a guide. Connect all of the plugs. Use the *Interconnect Diagram* in the *Appendix* section to properly make all of the connections.
21. Plug the power cord into the P-600 and into a wall outlet. Move the grit shaft back and forth with the keypad keys while watching the X Axis belt. If there is excessive noise or if the belt is loose the phillips head screws that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper

belt tension.

22. Attach the Y-Axis transmission and install the belt as outlined above in *Y-Axis Transmission Assembly Replacement.*
23. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
24. Attach the chartwheel lever and make sure that the chartwheels are oriented properly with respect the lever position and that the set screw in the lever body is tightened.
25. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.

If problems arise contact Ioline customer service

Chart Tape Replacement

1. Turn off the P-600 and disconnect the power cord.
2. Use an exacto knife to pull up one corner of the old chart tape.
3. Firmly grip the pulled up corner and remove the old chart tape by peeling it out of the molded groove on the front of the platen. Clean the surface of excess glue.
4. Pull a strip of new chart tape off of the roll. Make sure that the new strip of tape is slightly longer than the length of the platen.
5. Carefully press the new chart tape into the molded groove in the platen. Make sure that the air holes are not covered.
6. Trim excess tape from the end of the platen.

Reconnect the power cord and interface cable to the P-600.

Take Up Shaft And Feed Shaft Subsystems

Transmission

Take Up Motor Assembly Replacement:

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Disconnect the black Take-up motor cable from the bottom of the P-600. Located

under the keypad on the right side of the machine.

3. Remove the “Strain Relief”. This is the piece of black plastic that keeps the take-up motor cable from rubbing against the motor housing. To remove it, use a pair of pliers to press the top and bottom of the strain relief together (**Caution:** Don’t crimp down too hard). Then pull the strain relief toward the plotter while gently rocking up and down. Remove the strain relief from the cable, and set it aside.
4. Remove the two phillips head screws on top and bottom of the take-up motor housing.
5. Slide the silver housing off the motor and unplug the black cable from the motor.
6. Remove the take-up key from the motor shaft. On one side of the key, use a (1/8)HEX wrench to loosen the set screw. Slide the key off the motor shaft. When reattaching the key, be sure to tighten the set screw against the flat side of the motor shaft.
7. Remove the motor from the take-up plate by removing the 4 (11/32) nuts around the motor.
8. The motor will have a plate attached to it. Remove it by unscrewing the 4 screws with a (5/64) HEX wrench. Reattach the plate to the new motor.
9. Reassemble the take-up motor assembly by reversing the order of these instructions.

Support Block Replacement

1. The support block is fastened with three nylock nuts use the 3/8” nut driver to loosen and remove the hardware. A strong pull may be required to remove the block from threaded studs.
2. Replace the support block using the old fasteners that were removed above.

Test the take up shaft with the Roll key on the keypad. If any binding occurs the hardware can be loosened and small adjustments can be made. DO NOT lubricate the support blocks. They are designed to provide a certain amount of drag on the feed and take up shafts.

Take Up Shaft Repair

The components on the take up shaft are permanently bonded together with the exception of the set screws on both ends of the shaft. If the take-up shaft is slipping on the inner shaft, use a (1/8)HEX wrench to tighten the screws. Damaged parts have to be replaced with a complete new assembly.

Feed Shaft Repair

All of the components on the feed shaft are permanently bonded together so there are no user serviceable items. Damaged parts have to be replaced with a complete new assembly.

Electrical Subsystems

Power Supply Replacement

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
3. Discharge any static electricity that has accumulated and remove the power connector (brown and blue wires) from power supplies. Unplug the output cable (J3 or J7) on the logic board. Use the *Interconnect Diagram* in the *Appendix* section as a location guide.
4. Remove the 4 screws that hold the unit in the metal pan and pull the assembly out.
5. Install the new assembly with the same hardware removed above. Make sure that the output cables face the logic board.
6. Connect the power plug to the supply and the output cable to the logic board. They only fit on one way. Use the *Interconnect Diagram* in the *Appendix.*
7. Plug the power cord into the P-600 and into a wall outlet. Test all of the functions with the keypad.
8. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
9. If problems arise contact Ioline customer service.

Rear Panel Replacement

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) end cover. See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Remove the gray ribbon cable (blue socket at J2 near the right end plate) by pushing the blue tabs away from the center of the connector. The plug should be easy to pull out.
5. Pull the plug through the hole in the end plate. The encoder wires may have to be moved out of the way.
6. Disconnect the gray ribbon cable from keypad circuit board connector. Disconnect the three power wires from the power entry module. Cut the cable tie that holds the wire bundle to the ground wire.
7. Loosen and remove the two nuts holding the rear panel assembly to the right end plate.
8. Attach the new rear panel assembly making sure that the power switch faces the rear of the plotter.
9. Connect the gray ribbon cable to the keypad assembly with the red stripe (pin 1) on the edge closest to the mounting holes. Plug the three power wires into the power entry module using figure 5-8 below as a guide.
10. Push the logic board plug through the hole in the end plate. The encoder wires may have to be moved out of the way.
11. Open the blue tabs away from the center of the connector before inserting the gray ribbon cable into the blue socket at J2. Gently push the plug into the slot. The tabs will snap closed when the plug is properly seated. The red stripe (pin 1) on the edge should be closest to front of the machine.
12. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
13. Plug the power cord into the P-600 and into a wall outlet. Test all of the keypad keys and make sure that all of the functions are working. When the carriage moves on the traverse extrusion watch the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32” nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.

14. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
15. If problems arise contact Ioline customer service.

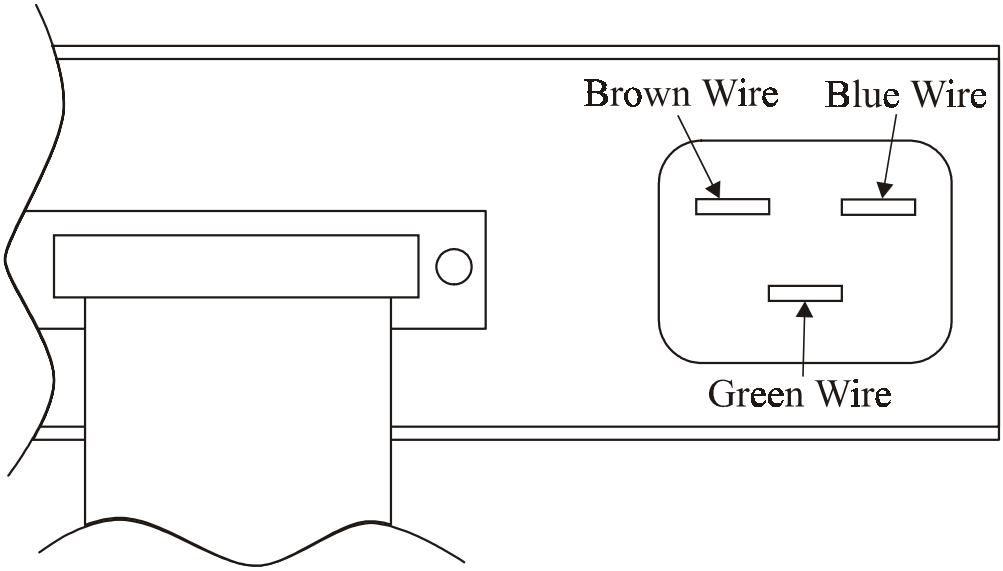


Figure 5-8. Power Cable Connection Diagram.

Electronic Subsystems

Main Logic Board Replacement

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
3. Mark all of the main logic board connectors with a felt tip pen before disconnecting them. This will make it easier to correctly install the connectors after inserting the new logic board.
4. Discharge any static electricity that has accumulated and remove all of the plugs and connections on the logic board. Use the *Interconnect Diagram* in the *Appendix* section as a location guide.

5. Remove the logic board by loosening the four phillips head screws and pulling the unit out of the track in the platen.
6. Replace the new logic board making sure to insert the top edge into the support track in the platen. Insert and tighten the four phillips screws from above. The fasteners only need to be snug and can damage the logic board if over tightened.
7. Connect all of the plugs on the logic board. Use the *Interconnect Diagram* in the *Appendix* section and the notes from step 4 as a guide.
8. Plug the power cord into the Summit and into a wall outlet. Test all of the functions with the keypad.
9. Reconnect the serial cable and perform test plots. Reassemble the Summit in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
10. If problems arise contact Ioline customer service.

Resetting the Factory Defaults

There are two ways to restore the factory default system parameters.

Default Reset Functions	Result
Hold down the Start/Stop key while turning on the power	Resets all factory parameter defaults but keeps the X/Y calibration values.
Hold down the Up Arrow key while turning on the power	Resets all factory parameter defaults and clears the X/Y calibration values. This option should only be used when replacing a ROM chip.

Keypad Replacement

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the plotter and remove the power and serial cables.
2. Remove the right (4 screws) end cover. See *Removing the End Covers and Dust Cover* above.
3. Loosen and remove the two nuts holding the keypad assembly to right end plate.

The Y Axis transmission will have to be pulled off of the threaded studs with the belt completely loose to accomplish this task. Make sure that the belt tensioner is not tangled in the belt while moving the transmission.

4. Disconnect the gray ribbon cable from keypad circuit board connector.
5. Remove keypad assembly.
6. Connect the gray ribbon cable to the new keypad assembly with the red stripe (pin 1) on the edge closest to the mounting holes.
7. Fasten the new keypad assembly to the end plate with the hardware from above.
8. Plug the power cord into the P-600 and into a wall outlet. Test all of the keypad keys and make sure that all of the functions are working. When the carriage moves on the traverse extrusion watch the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32" nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.
9. Reconnect the serial cable and perform test plots. Reassemble the P-600 in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
10. If problems arise contact Ioline customer service.

Installing a ROM Upgrade

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

Failure to follow these directions explicitly may cause permanent damage to the ROM and may cause the plotter to malfunction.

1. Leave the ROM in the protective case until it is ready to be installed.
2. Shut off the plotter and remove the power cable.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Ensure that the same static potential is achieved by attaching a grounding wrist strap to a non-painted surface on the inside of the plotter, and then attaching the strip to the technician.
5. Carefully remove the old ROM, in the U5 socket on the logic board, using a small flat tool under one end (between the ROM and its socket) and then the other end, gently rocking the ROM out of its socket.
6. Remove the new ROM from its protective case. Ensure the pins are straight and

evenly spaced.

7. Install the new ROM. Make sure that the notch in the ROM is pointed the same way as the other components on the logic board. In this case the notch must be pointed toward the center of the logic board.
8. When inserting the ROM be careful not to bend any of the pins, also be sure that all the pins are inserted in the socket.
9. Ensure the ROM is firmly seated in the socket by gently pushing down on both ends.
10. Replace the bottom cover.
11. Move carriage to left end plate.
12. Connect power cable and turn on plotter while holding in the Up Arrow key. Release the Up Arrow key when the carriage starts moving.

Installing DSP ROM Upgrade

Electrostatic discharge preventative measures must be adhered to during all assembly replacement procedures.

Failure to follow these directions explicitly may cause permanent damage to the DSP ROM and may cause the plotter to malfunction.

1. Leave the DSP ROM in its protective case until it is ready to be installed.
2. Shut off the plotter and remove the power cable.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Ensure that the same static potential is achieved by attaching a grounding wrist strap to a non-painted surface on the inside of the plotter, and then attaching the strip to the technician.
5. Carefully remove the old DSP ROM, in the U2 socket on the logic board, using a small flat tool under one end (between the DSP ROM and its socket) and then the other end, gently rocking the DSP ROM out of its socket.
6. Remove the new DSP ROM from its protective case. Ensure the pins are straight and evenly spaced.
7. Install the new DSP ROM. Make sure that the notch in the ROM is pointed the same way as the other components on the logic board. In this case the notch must be away from the keypad.
8. When inserting the DSP ROM be careful not to bend any of the pins, also be sure that all the pins are inserted in the socket.

9. Ensure the DSP ROM is firmly seated in the socket by gently pushing down on both ends.
10. Replace the bottom cover.
11. Move carriage to left end plate.

Connect power cable and turn on the plotter.

Addendum M-28

This addendum covers the major maintenance and repair differences between the M-28 and the P-600. The following information is covered here:

- Product Overview
- P-600/M-28 Operation, Maintenance, and Repair Distinctions
- Technical Drawings and BOMs for Unique M-28 Components

Product Overview

The Ioline M-28 Marker Plotter can handle any large format plotting operation up to 72 inches (1.8 meters) wide and 28 yards (25 meters) long. Three industry standard plotter languages (HPGL 7475, HPGL 7596, and DMPL) are supported. It is most commonly used in conjunction with apparel design software for plotting large marker plot patterns. The M-28 also comes with Control Center software that allows adjustment of a variety of system settings from the computer.

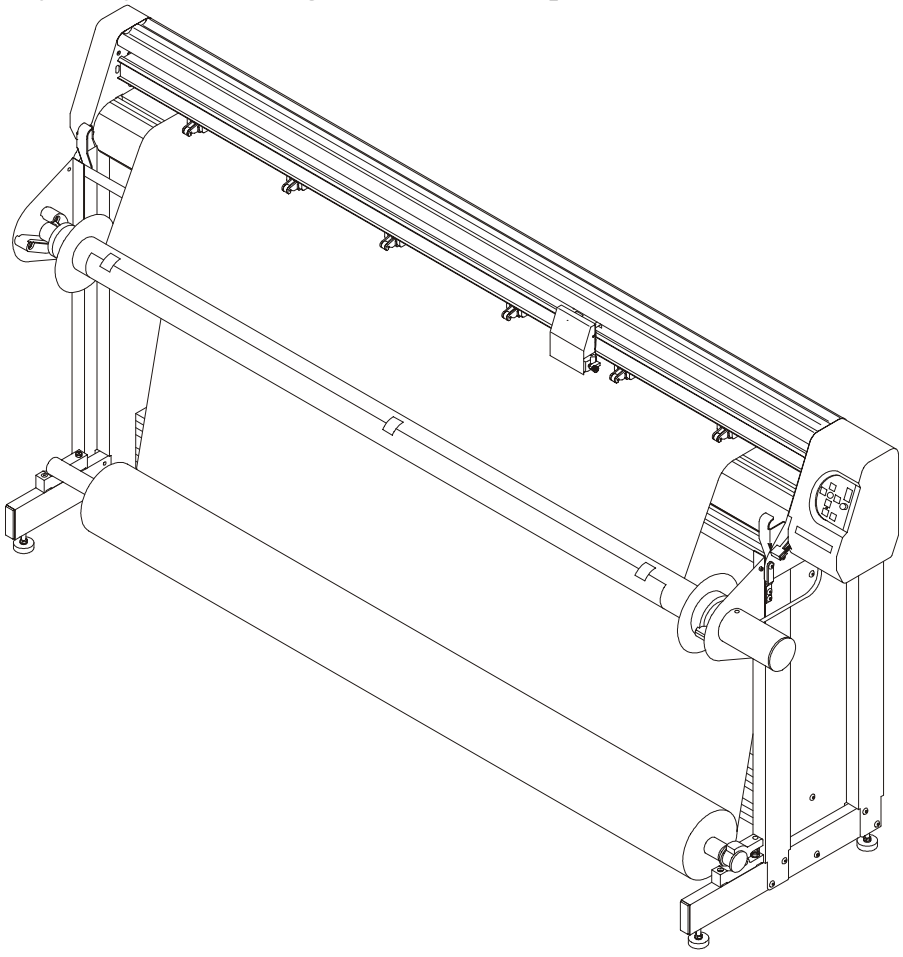


Figure A-1. Ioline M-28 Marker Plotter.

Specifications

Plotting Speed (Max)	30 in/s
Plotting Acceleration (max)	2 g
Pen Force	1 to 275 g
Plotting Throughput	Up to 47 m/hr (52 yd/hr)
Maximum Frame Size	Length: 1.17 m (46.0 in.) Width: 1.88 m (74.0 in.)
Frame-To-Frame Alignment	Within 1.27 mm (0.050 in.)
Intra-Frame Repeatability	Within 0.51 mm (0.020 in.)
Roll Media Inside Core Diameter	76 mm (3.0 in.)
Maximum Outer Roll Diameter	228 mm (9.0 in.)
Paper Width	0.91 m (36.0 in.) to 1.80 m (74.0 in.)
Maximum Paper Take-Up	545 m (600 yd) #30 paper 455 m (500 yd) #35 paper
Scale	1% to 999%
Pens	Refillable or disposable HP-style fiber, roller ball (ball-point), or felt tip. 0.25 in. to 0.90 in diameter.
Power Requirements	90-264 VAC, 47-66 Hz, 160 watts
Overall Physical Dimensions	Height: 1.17 m (46 in.) Width: 2.26 m (89 in.) Depth: .56 m (22 in.)
Shipping Weight	129 kg (285 lbs)
Environmental Range	Temperature: 0-35 °C (32-95 °F) Relative Humidity: 30% - 85% (non-condensing)
Hardware Interface	Standard RS-232C serial interface: 9600 Baud, No parity, 8 data bits, 1 stop bit, hardware or software (XON/XOFF) handshaking, DB-25S connector, requires DB-25P mating connector.
Command Languages	DM/PL, HP/GL: HP-7475 & HP-7596

* This measurement requires that Frame Gap be properly set in the Control Center software that comes with the M-28 Marker Plotter.

How The M-28 Works

The M-28 uses the same technology described above in *Chapter 1, How The P-600 Works.* The exception is that a frame sensor and registration logic is not included to ensure frame accuracy over very long distances. These mechanical and electronic differences limit the plotting length to 25 meters (28 yards).

P-600/M-28 Operation, Maintenance, and Repair Distinctions

The only operating difference between the M-28 and P-600 marker plotters is the maximum length of the plot. The mechanical and electronic implications are that the carriage and logic board are different. Software operation differs because Frame Gap settings will have to be used to assure frame-to-frame accuracy. Every other system on the plotter is the same as that on the P-600 with respect to maintenance and repair. The following information and tables are a complete summary of the variation in operation, part numbers, and trouble shooting procedures.

Operation Differences

The primary operating difference is in the Ioline Control Center software. The Frame Gap settings will always be adjustable and the Sensor Enable option will be unavailable.

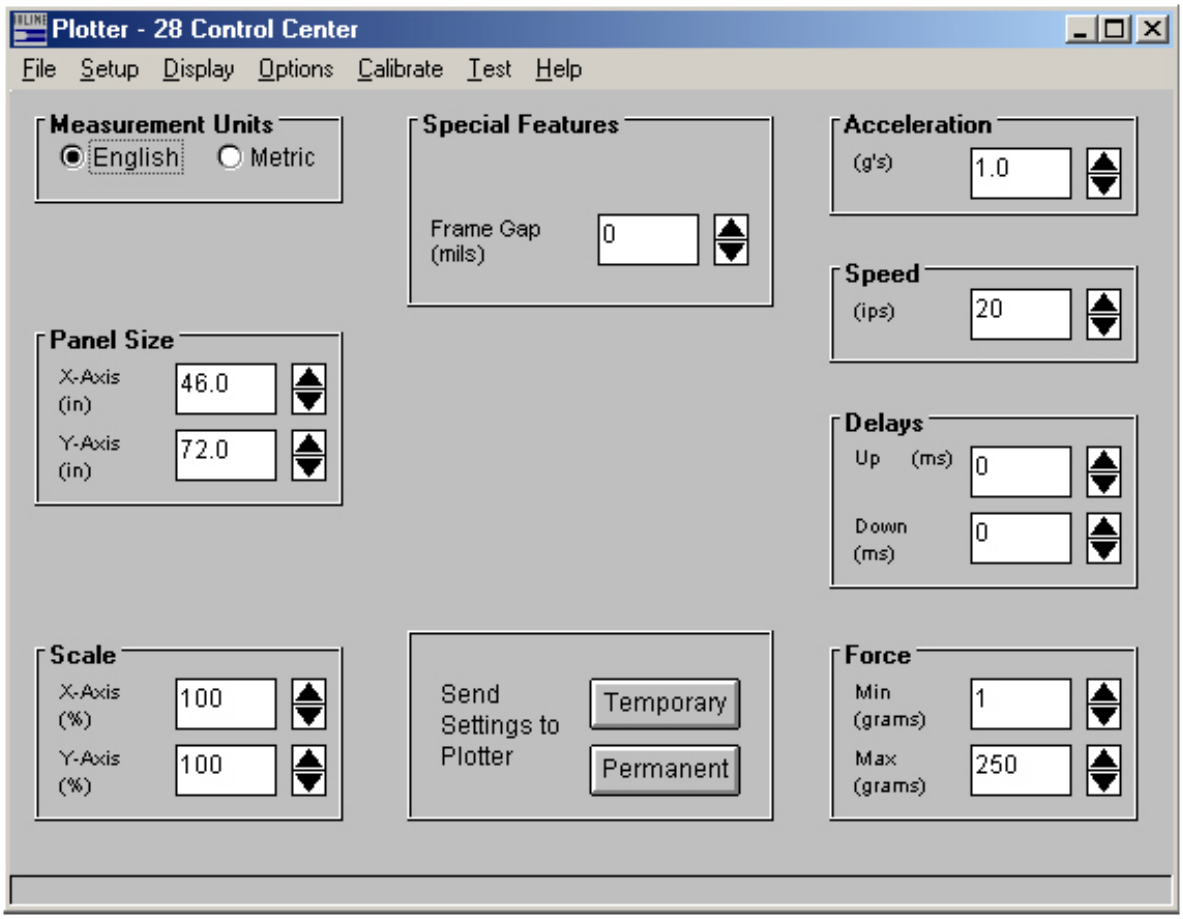


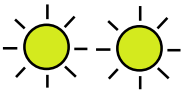
Figure A-2. Ioline Control Center Screen for the M-28.

M-28 Part Number Equivalents

Part numbers for major assemblies that are different in the M-28 and P-600 are listed below. The component numbers within each assembly are listed in the bills of material (BOM) provided in the following section.

Part Name	P-600 Part Number	M-28 Part Number
Top Internal Assembly	105952	106362
Top External Assembly	106175	106350
Accessory Kit	106287	106287
Carriage Assembly	106235	106365
Logic Board	106238	106368

LED Code Differences

LED Sequence	Probable Causes	Solution
Continuous Beeping	**P-600 ONLY** - This LED is only present on the P-600 and has to do with the frame sensor and registration.	Not Available
 *3+ Second pause then repeat continuous beeping*	**M-28 ONLY** - The maximum marker length for the M-28 (9.1 meters) has been exceeded	- Remove the completed markers- Reload the paper - Press start point and continue plotting

Bill of Materials for Unique M-28 Components

This section contains bills of materials (BOMs), assembly diagrams, and circuit schematics for all of the major components that are unique to the M-28. The following subsystem details are available:

- M-28 Chassis (Internal) Assembly
- M-28 Chassis (External) Assembly and Accessory Kit
- Carriage Assembly and Logic
- Main Logic Board Assembly

Accessory Kit Bill of materials - M-28

106287	P-600/M-28 Accessory kit

Ioline part Number	Description	Number of Parts used
100150	CUTTER, PAPER	1
104352	BRUSH, GRIT SHAFT	1
104357	PEN, PRESSURIZED BALL POINT	1
104366	WRENCH, ALLEN, .156, TEE	1
104921	CABLE, RS-232, 15 FT	1
105997	DISK, CONTROL CENTER, 3.5"	1
106242	USER GUIDE, 600/28	1
104444	HUB FEED ASSY	2
105968	PEN, PILOT, V-BALL	1
106185	BELT, UNWINDING, 600/28	2
104362	STATIC GARLAND, 77.56 IN	1
105118	CABLE, SERIAL, 9F-25M PIN	1
107032	FORM, ADDENDUM, UG, 600A/28A	1
101934	SCREW 1/4-20, 1.00 LG, BTN HD SOCK	4
100059	SCREW #1/4-20, .625 LG, BTN HD SOCK	6
103764	BOX, SHIPPING, 9 X 7 X 5	1
104473	FORM, WARRANTY	1
106283	PACKING LIST, ACC KIT, 600/28	1
106393	PROC, UNWINDING BELTS, 600/28	1
106746	PROC. INST. ANTI-STATIC	1
106342	WARRANTY, LIMITED, 600/28	1

Carriage Assy Bill of Materials - M-28

106365	Carriage Assembly, M-28

Ioline Part Number	Part Description	Number of Parts used
106366	PCB ASSY, CARRIAGE, P28	1
105435	WHEEL, CARRIAGE	3
102655	BEARING, FLANGE, .250ID, .500OD	6
105894	SCREW, SHOULDER, .250 DIA, .625LG	2
106246	JAW, CARRIAGE	1
106247	BLOCK, SPACER, CARRIAGE, Z-AXIS	1
106248	BLOCK, BASE, CARRIAGE, Z-AXIS	1
106250	MOUNT, VOICE COIL BOBBIN, CARRIAGE	1
106253	CLAMP, PEN, CARRIAGE	1
106254	FLEXURE, CARRIAGE, Z-AXIS	2
106256	AXLE, LEVER, CARRIAGE	1
106309	SPRING, EXTENSION, .300 OD, .049 D	1
106156	BASE, CARRIAGE	1
106311	AXLE, V-WHEEL, UPPER	1
103390	WSHR, .195ID, .354OD, .032 THK, SS	2
103896	WSHR, #2, FLAT, STEEL	3
106130	NUT, #10-32, ROUND THUMB	1
104012	NUT, #6-32, KEP	3
100705	PAD, PEN CAP, 1/4 DIA	3
103447	SCREW #10-32, 1.75 LG, BTN HD SOCKE	1
106219	BLOCK, TOP, CARRIAGE	1
106216	LEVER, FRONT, CARRIAGE	1
106217	LEVER, REAR, CARRIAGE	1
103825	SPACER, SHAFT	1
106220	SPRING, COMPRESSION, .300 OD, .022D	1
100067	SCREW #8-32, .375 LG, PHP, BLK OXI	2
106358	TAPE, DOUBLE COATED, .5 IN WIDE	5
106305	SCREW, #6-32, 1.5" LG, BHCS	2
106307	SCREW, #6-32, 1.25" LG, BHCS	2
105065	SCREW #6-32, .25 LG, BTN HD	5
104337	SCREW #4-40, .375 PHP, SEMS	2
101860	SCREW #2-56, .312 LG, PHP	3
100111	SPACER, .254ID, .375OD, .030LG, GOL	1
106321	SCREW, #6-32, 1.0 LG, BHCS	1

Carriage PCB Assembly Bill of Materials - M-28

106366	Carriage PCB, M-28	

Ioline Part Number	Part Description	Number of Parts used
106385	PCB, CARRIAGE	1
102624	CONN, FLEX CABLE, 12 PIN, R ANGLE	1
103726	TYRAP, .1 IN X 3 IN, BLACK	1
104646	VOICE COIL	1
101369	HEATSHRINK, .125 DIA, BLK	0.5

PCB Assembly Bill of Materials - M-28

106368	PCB Assembly, M-28

Ioline Part Number	Part Description	Number of Parts used
106360	IC, ROM, P28 PROG	1
104527	IC, ROM, UNPROG 27020	1
105510	IC, FPGA, PROG, 1010B,2200/910	1
105419	PCB ASSY, LOGIC, 2200	1

FGI Level Bill of Materials - M-28

106350	FGI, M-28

Ioline Part Number	Description	Number of Parts used
101031	FOAM BLOCK, 2 IN X 2 IN X 2 IN	2
106259	LEG ASSY, RIGHT, 600	1
106258	LEG ASSY, LEFT, 600	1
100278	TYRAP, .15 IN X 9 IN	1
105167	COVER, RIGHT END, S88	1
105166	COVER, LEFT END, S88	1
106362	CHASSIS ASSY, 28	1
106174	CROSSMEMBER, 600/28	1
106264	SHAFT ASSY, FEED, 600	1
106263	SHAFT ASSY, TAKEUP, 600	1
106244	DANCER BAR ASSY, FRONT P600	1
106245	DANCER BAR ASSY, REAR, P600	1
103560	LABEL, SHIPPING CARTON, IOLINE, 20	2
106284	BOX, SHIP, 600/28	1
106285	PACKING LIST, 600/28	1
106286	LABEL, CARTON, END, APPAREL	2
106287	ACCESSORY KIT, 600/28	1
105762	LABEL, REAR PANEL, FCC/CE	1
106241	WSHR,#8-32,.190 ID,.416 OD,.080THK	8
104926	STANDOFF, #8-32, 5.25 LG	2
104725	STANDOFF, #8-32, 1.75 LG	2
101581	SCREW #8-32, .375 FHP, BLACK	6
106018	LABEL, FRONT, P600	1
106243	COVER ASSY, TAKE UP, P600	1
106229	COVER, CARRIAGE, P-28	1
105065	SCREW #6-32, .25 LG, BTN HD	3
105969	KEY, TAKE UP, 600/28	1
106334	SCREW #1/4-20, .375 LG, SET, CUP	1
106339	STRAIN RELIEF, PLASTIC, .30-.35 ID	1
104013	NUT, #8-32, KEP	4
106351	GUIDE, UNPACKING THE 600/28	1

Addendum *P-600H*

This addendum covers the major maintenance and repair differences between the 600H and the P-600. The following information is covered here:

- Product Overview
- 600H Operation, Maintenance, and Repair Distinctions
- Technical Drawings and BOMs for Unique 600H Components

Product Overview

The Ioline 600H Marker Plotter can handle any large format plotting operation up to 72 inches (1.8 meters) wide and 600 yards (meters) long. Three industry standard plotter languages (HPGL 7475, HPGL 7596, and DMPL) are supported. It is most commonly used in conjunction with apparel design software for plotting large marker plot patterns. The 600H also comes with Control Center software that allows adjustment of a variety of system settings from the computer.

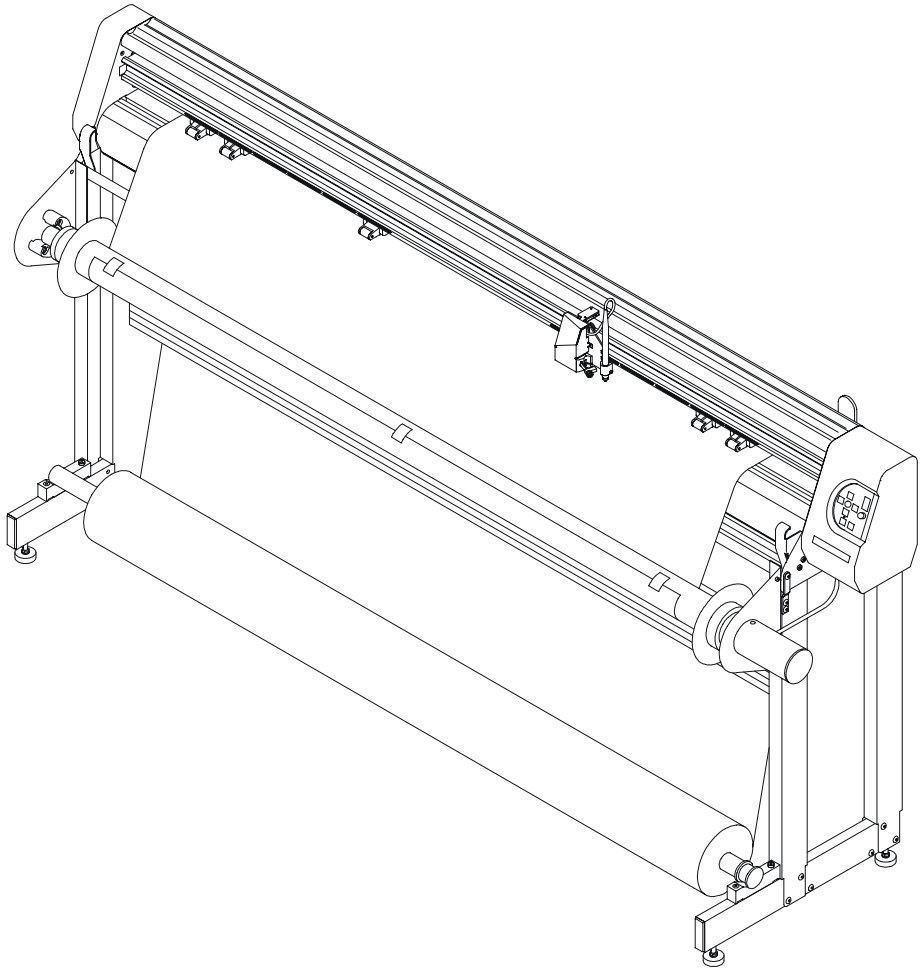


Figure A-1. Ioline 600H Marker Plotter.

Specifications

Plotting Speed (Max)	30 in/s
Plotting Acceleration (max)	2 g
Pen Force	1 to 275 g
Plotting Throughput	Up to 52 yd/hr
Maximum Frame Size	Length: 1.17 m (46.0 in.) Width: 1.88 m (72.0 in.)
Frame-To-Frame Alignment	Within 1.27 mm (0.050 in.)
Intra-Frame Repeatability	< .010 mm (0.007 in.)
Roll Media Inside Core Diameter	76 mm (3.0 in.)
Maximum Outer Roll Diameter	228 mm (9.0 in.)
Paper Width	0.91 m (36.0 in.) to 1.80 m (74.0 in.)
Maximum Paper Take-Up	545 m (600 yd) #30 paper 455 m (500 yd) #35 paper
Scale	1% to 999%
Pens	Refillable or disposable HP-style fiber, roller ball (ball-point), or felt tip. 0.25 in. to 0.90 in diameter.
Power Requirements	90-264 VAC, 47-66 Hz, 160 watts
Overall Physical Dimensions	Height: 1.17 m (46 in.) Width: 2.26 m (89 in.) Depth: .56 m (22 in.)
Shipping Weight	129 kg (295 lbs)
Environmental Range	Temperature: 0-35 °C (32-95 °F) Relative Humidity: 30% - 85% (non-condensing)
Hardware Interface	Standard RS-232C serial interface: 9600 Baud, No parity, 8 data bits, 1 stop bit, hardware or software (XON/XOFF) handshaking, DB-25S connector, requires DB-25P mating connector.
Command Languages	DM/PL, HP/GL: HP-7475 & HP-7596

How The 600H Works

The 600H uses the same technology described above in *Chapter 1, How The P-600 Works.*

600H / P-600 Operation, Maintenance, and Repair Distinctions

There are very few operating differences between the P-600, and the 600H. On the P-600 the sensor is to the left of the pen, on the 600H the sensor is to the right of the pen. So you have to allow enough room on the right side of the paper for the sensor mark to be drawn, and scanned. The pinch wheels for the 600H are wider than the P-600 to allow for better tracking. The pinch wheel lever is located on the back of the plotter instead of the front. The rest of the differences relate to the visual differences where the 600H is an entirely new design of plotter. There are too many visual differences to mention.

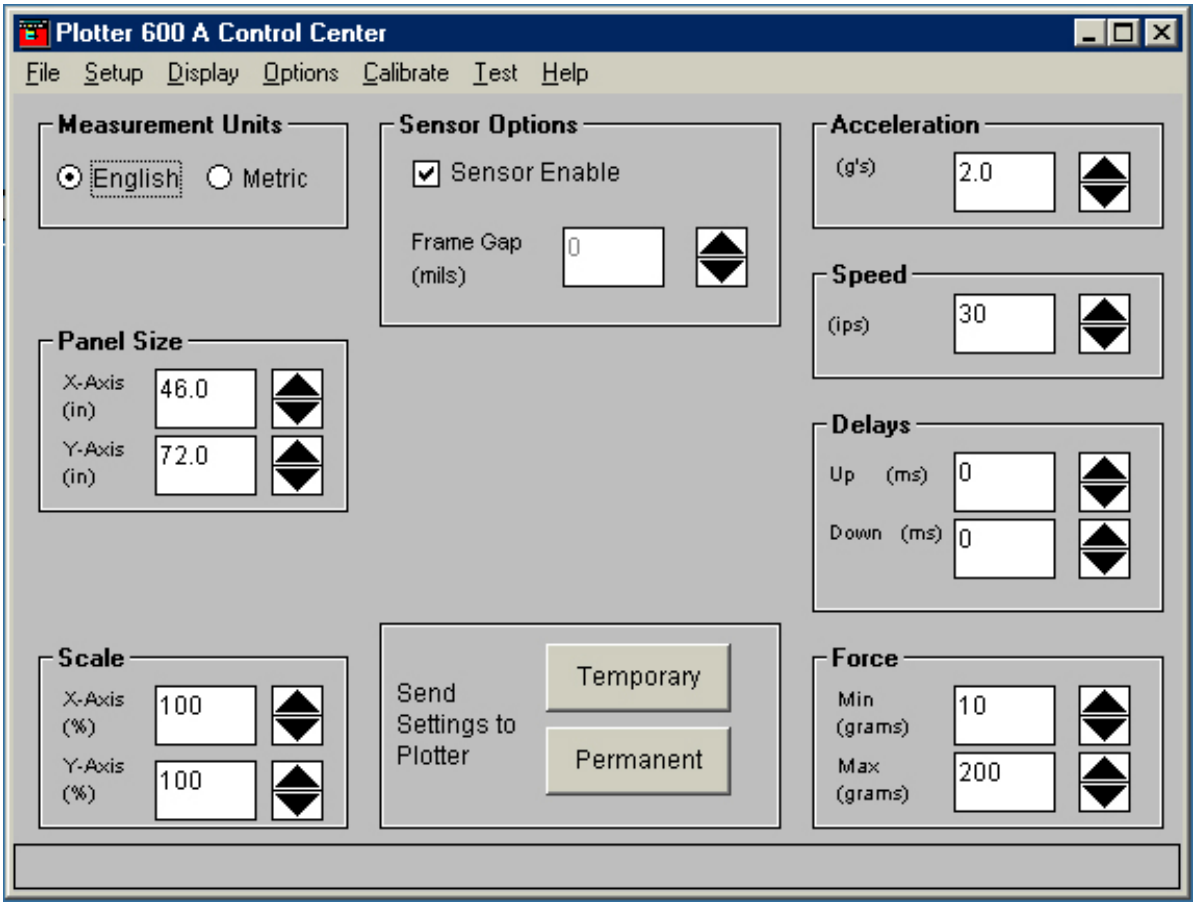


Figure A-2. Ioline Control Center Screen for the 600H

600H Part Number Equivalents

Part numbers for major assemblies that are different in the 600H are listed below. The component numbers within each assembly are listed in the bills of material (BOM) provided in the following section.

Part Name	P-600 Part Number	M-28 Part Number
Top Internal Assembly	105952	106362
Top External Assembly	106175	106350
Accessory Kit	106287	106287
Carriage Assembly	106235	106365
Logic Board	106238	106368

LED Code Differences

There are no LED code differences between the P-600, and the 600H. See “L.E.D. codes for the P-600” in chapter 4.

Bill of Materials for Unique 600H Components

This section contains bills of materials, assembly diagrams, and circuit schematics for all of the major components that are unique to the 600H. The following subsystem details are available:

- 600H Chassis (Internal) Assembly
- 600H Chassis (External) Assembly and Accessory Kit
- Carriage Assembly and Logic
- Main Logic Board Assembly

Accessory Kit Bill of materials - P-600H

106287 P-600H Accessory Kit

Ioline part Number	Description	Number of Parts used
100150	CUTTER, PAPER	1
104352	BRUSH, GRIT SHAFT	1
104357	PEN, PRESSURIZED BALL POINT	1
104366	WRENCH, ALLEN, .156, TEE	1
104921	CABLE, RS-232, 15 FT	1
105997	DISK, CONTROL CENTER, 3.5"	1
106394	DISK, CONTROL CENTER, 3.5"	1
106760	DISK, CONTROL CENTER, 32 BIT, 3.5"	1
106242	USER GUIDE, 600/28	1
104444	HUB FEED ASSY	2
105968	PEN, PILOT, V-BALL	1
106185	BELT, UNWINDING, 600/28	2
104362	STATIC GARLAND, 77.56 IN	1
105118	CABLE, SERIAL, 9F-25M PIN	1
107032	FORM, ADDENDUM, UG, 600A/28A	1
101934	SCREW 1/4-20, 1.00 LG, BTN HD SOCK	4
106269	SCREW, #1/4-20, 2" LG	2
100059	SCREW #1/4-20, .625 LG, BTN HD SOCK	6
103764	BOX, SHIPPING, 9 X 7 X 5	1
104473	FORM, WARRANTY	1
106283	PACKING LIST, ACC KIT, 600/28	1
106393	PROC, UNWINDING BELTS, 600/28	1
106746	PROC. INST. ANTI-STATIC	1
106342	WARRANTY, LIMITED, 600/28	1

Carriage Assembly Bill of Materials - P-600H

107020	P-600H Carriage Assembly

Ioline part Number	Description	Number of Parts used
106863	BASE, CARRIAGE, I/S-600/28	1
106864	BRACKET, SENSOR, CARRIAGE, I/S-600	1
106464	BLOCK, SPACER, FLEXURE	1
106622	JAW, CARRIAGE, SC98	1
107209	JAW CARRIAGE, MOLDED CLAMP, SC98	1
106523	CLAMP, PEN/KNIFE, CARRIAGE	1
106772	CLAMP, PEN/KNIFE, MOLDED	1
106455	SPACER, MOUNT, VC, SC98	1
106949	DOWEL, PIN .0625DIA. X .625	1
106954	FILTER, SENSOR LENS	1
106869	PCB ASSY, CARRIAGE, I/S-600	1
106236	PCB ASSY, CARRIAGE, P600	1
106458	ARM, CARRIAGE, SC98	1
106460	MOUNT, VC, CARRIAGE, SC98	1
106230	WHEEL, CARRIAGE, SC98	3
106254	FLEXURE, CARRIAGE, Z-AXIS	2
103481	WSHR, .196ID, .312OD, .062TH, NYLON	1
106073	SCREW, SHOULDER, .187 DIA, .375 LG	2
106462	SPRING, EXTENSION, .25 OD, .037 DIA	1
107178	SPRING, EXT, .25 OD, .04 ID, 75 LG	1
106621	SPRING, COMP., .24 OD, 1.25 LG	1
106130	NUT, #10-32, ROUND THUMB	1
103726	TYRAP, .1 IN X 3 IN, BLACK	4
106115	SPACER, .188 ID, .313 OD, .188 LG	1
100705	PAD, PEN CAP, 1/4 DIA	1
106750	CAP, VINYL, .093 ID, BLK	1
106457	PLATE, FLEXURE	2
106526	SCREW, SHOULDER, .187 DIA, .5625 LG	1
107058	BRACKET, SENSOR, TUBE	1
106094	WASHER, SPRING, .193 ID, .370 OD	3
107014	SHAFT, CLAMP STOP, CARRIAGE	1
107274	WSHR, .5 OD, .145 ID, .010 T, PTFE	1
106314	SCREW, #4-40, .25 LG, PHP, NYLON	3
101860	SCREW #2-56, .312 LG, PHP	3
106626	WSHR, .195 ID, .245OD, .02 THK	3
106530	WSHR, .195 ID, .245 OD, .03 THK	3
106524	SCREW, #10-32, 2.OO LG, BHCS	1
106777	SCREW, THUMB, #10-32, 1.33 LG	1
106307	SCREW, #6-32, 1.25" LG, BHCS	4
104337	SCREW #4-40, .375 PHP, SEMS	2
104560	SCREW #4-40, .250 PHP, SEMS	2
106527	SCREW, #6-32, .312 LG,FHP, BLK	3
103896	WSHR, #2, FLAT, STEEL	3
106625	NUT, #6-32, HEX, SMALL PATTERN	2
106532	NUT, #6-32, HEX, NYLOCK	1
104471	TAPE, UHMW, .43 WIDE	0.25
106528	TAPE, DOUBLE COATED, 1.25 W	2.75
106358	TAPE, DOUBLE COATED, .5 IN WIDE	1
107018	SCREW, #6-32, .625 LG, FHP	2
107381	SCREW, #6-32, 1.0 LG, FHP	1
107018	SCREW, #6-32, .625 LG, FHP	0.625

Carriage PCB Assembly - P-600H

106236	P-600H Cariage PCB assy

Ioline part Number	Description	Number of Parts used
105966	PCB, CARRIAGE, 28/600	1
106385	PCB, CARRIAGE	1
102624	CONN, FLEX CABLE, 12 PIN, R ANGLE	1
103726	TYRAP, .1 IN X 3 IN, BLACK	1
104646	VOICE COIL	1
105691	WAND, FRAME SENSOR, W\A	1
100237	CONN, TERMINAL, RING, #4, 22-18 GA,	1
106332	CABLE ASSY, 3" WITH LUG	1
100223	WIRE 22 GA ST GN X 3 IN, UL1007/10	1
101370	HEATSHRINK, .250 DIA, BLK	0.5
101369	HEATSHRINK, .125 DIA, BLK	0.25

PCB Assembly - P-600H

107047	P-600H PCB Assembly

Ioline part Number	Description	Number of Parts used
105418	IC, ROM, DSP, 2200, PROG	1
105510	IC, FPGA, PROG, 1010B,2200/910	1
107048	IC, ROM, 600H, PROG	1
105419	PCB ASSY, LOGIC, 2200	1

FGI Level Bill of Materials - P-600H

107050	P-600H FGI Level

Ioline part Number	Description	Number of Parts used
107052	CHASSIS, 600H	1
106174	CROSSMEMBER, 600/28	1
106877	LEG ASSY, RIGHT, I/S-600	1
106878	LEG ASSY, LEFT, I/S-600	1
105167	COVER, RIGHT END, S88	1
105166	COVER, LEFT END, S88	1
106270	FLANGE ASSY, TAKEUP, 600	2
106264	SHAFT ASSY, FEED, 600	1
106263	SHAFT ASSY, TAKEUP, 600	1
106244	DANCER BAR ASSY, FRONT P600	1
106245	DANCER BAR ASSY, REAR, P600	1
106243	COVER ASSY, TAKE UP, P600	1
106284	BOX, SHIP, 600/28	1
107030	PACKING LIST, 600A/28A	1
106287	ACCESSORY KIT, 600/28	1
105969	KEY, TAKE UP, 600/28	1
101031	FOAM BLOCK, 2 IN X 2 IN X 2 IN	2
107029	LABEL, CARTON END, 600A/28A	2
103560	LABEL, SHIPPING CARTON, IOLINE, 20	2
105762	LABEL, REAR PANEL, FCC/CE	1
106018	LABEL, FRONT, P600	1
107114	LABEL, FRONT, LIGHT GRAY	1
106081	LABEL, WARNING, HAZARD, VOLTAGE	1
104926	STANDOFF, #8-32, 5.25 LG	2
104725	STANDOFF, #8-32, 1.75 LG	2
106241	WSHR,#8-32,.190 ID,.416 OD,.080THK	8
101581	SCREW #8-32, .375 FHP, BLACK	6
106334	SCREW #1/4-20, .375 LG, SET, CUP	1
104013	NUT, #8-32, KEP	4
106339	STRAIN RELIEF, PLASTIC, .30-.35 ID	1
100278	TYRAP, .15 IN X 9 IN	1
107019	COVER, CARRIAGE, I/S-600/28	1
107103	COVER ASSY, MOLDED CARR, I/S-600/28	1
107101	COVER, CARRIAGE, I/S-600	1
106620	SCREW, #6-32, .25LG, PHP, BLACK	2
107032	FORM, ADDENDUM, UG, 600A/28A	1
104008	SCREW #8-32, .375 LG, PHP SEMS	4

Addendum *600Ae*

This addendum covers the major maintenance and repair differences between the 600Ae and the P-600. The following information is covered here:

- Product Overview
- 600Ae Operation, Maintenance, and Repair Distinctions
- Technical Drawings and BOMs for Unique 600Ae Components

Product Overview

The Ioline 600Ae Marker Plotter can handle any large format plotting operation up to 72 inches (1.8 meters) wide and 600 yards (meters) long. Three industry standard plotter languages (HPGL 7475, HPGL 7596, and DMPL) are supported. It is most commonly used in conjunction with apparel design software for plotting large marker plot patterns. The 600Ae also comes with Control Center software that allows adjustment of a variety of system settings from the computer.

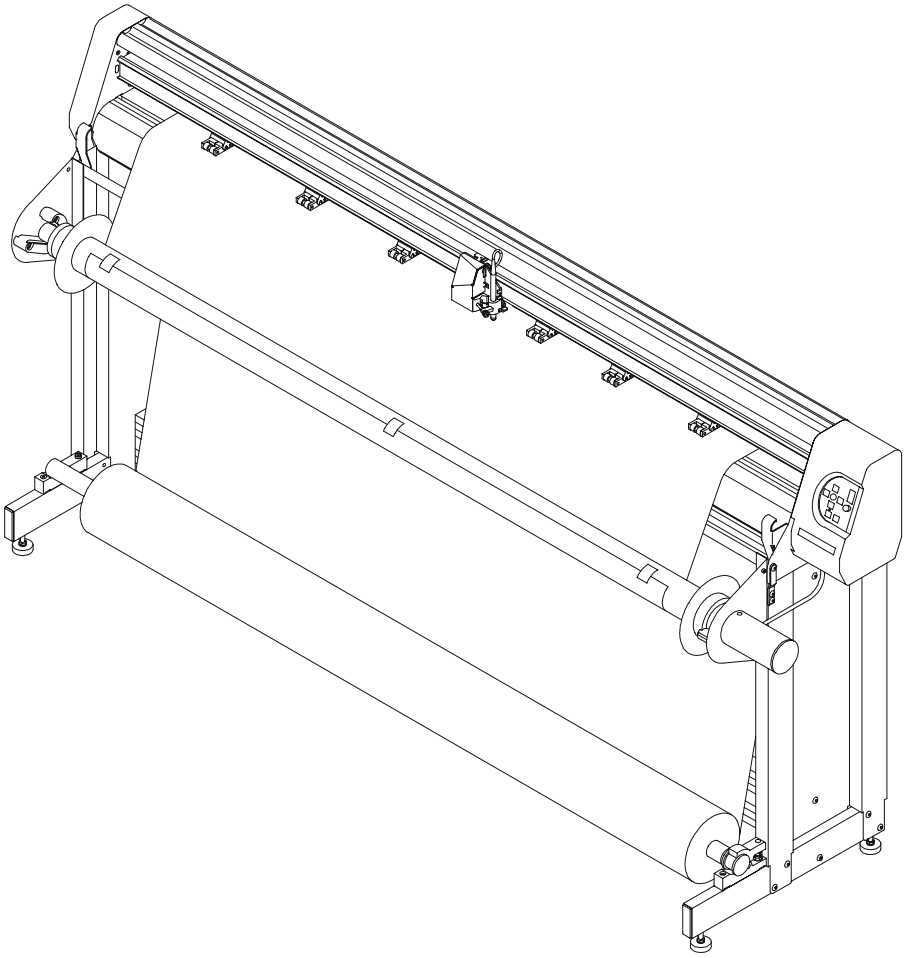


Figure A-1. Ioline 600Ae Marker Plotter.

Specifications

Plotting Speed (Max)	30 in/s
Plotting Acceleration (max)	2 g
Pen Force	1 to 275 g
Plotting Throughput	Up to 70 yd/hr
Maximum Frame Size	Length: 1.17 m (46.0 in.) Width: 1.88 m (72.0 in.)
Frame-To-Frame Alignment	Within 1.27 mm (0.050 in.)
Intra-Frame Repeatability	< .010 mm (0.007 in.)
Roll Media Inside Core Diameter	76 mm (3.0 in.)
Maximum Outer Roll Diameter	228 mm (9.0 in.)
Paper Width	0.91 m (36.0 in.) to 1.80 m (74.0 in.)
Maximum Paper Take-Up	545 m (600 yd) #30 paper 455 m (500 yd) #35 paper
Scale	1% to 999%
Pens	Refillable or disposable HP-style fiber, roller ball (ball-point), or felt tip. 0.25 in. to 0.90 in diameter.
Power Requirements	90-264 VAC, 47-66 Hz, 160 watts
Overall Physical Dimensions	Height: 1.17 m (46 in.) Width: 2.26 m (89 in.) Depth: .56 m (22 in.)
Shipping Weight	129 kg (295 lbs)
Environmental Range	Temperature: 0-35 °C (32-95 °F) Relative Humidity: 30% - 85% (non-condensing)
Hardware Interface	Standard RS-232C serial interface: 9600 Baud, No parity, 8 data bits, 1 stop bit, hardware or software (XON/XOFF) handshaking, DB-25S connector, requires DB-25P mating connector.
Command Languages	DM/PL, HP/GL: HP-7475 & HP-7596

How The 600Ae Works

The 600Ae uses the same technology described above in *Chapter 1, How The P-600 Works.*

600Ae / P-600 Operation, Maintenance, and Repair Distinctions

There are very few operating differences between the P-600, and the 600Ae. On the P-600 the sensor is to the left of the pen, on the 600Ae the sensor is to the right of the pen. So you have to allow enough room on the right side of the paper for the sensor mark to be drawn, and scanned. The pinch wheels for the 600Ae have two wheels for better tracking. The pinch wheel lever is located on the back of the plotter instead of the front, and finally the 600Ae allows you to adjust the frame gap right on the key-pad with the "Set Gap" button. This button allows you to close the gap between frames while you're plotting. *For a more detailed explanation of these fuctions see the 600Ae user guide available on our web site at www.ioline.com.* The rest of the differences relate to the visual differences where the 600Ae is an entirely new design of plotter. There are too many visual differences to mention.

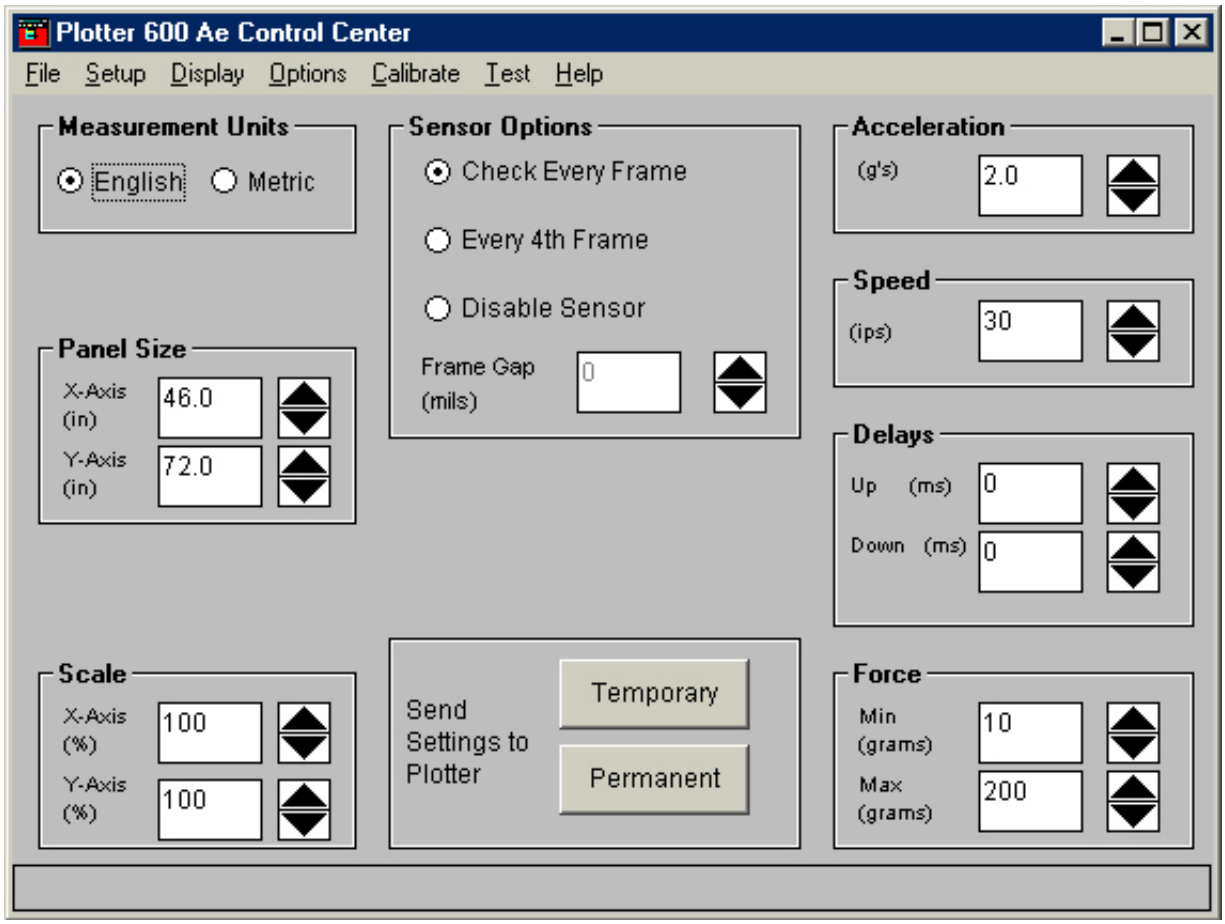


Figure A-2. Ioline Control Center Screen for the 600Ae

600Ae Part Number Equivalents

Part numbers for major assemblies that are different in the 600Ae are listed below. The component numbers within each assembly are listed in the bills of material (BOM) provided in the following section.

Part Name	P-600 Part Number	M-28 Part Number
Top Internal Assembly	105952	106362
Top External Assembly	106175	106350
Accessory Kit	106287	106287
Carriage Assembly	106235	106365
Logic Board	106238	106368

LED Code Differences

There is one LED code difference between the P-600, and the 600Ae. If you should see a blinking “Yellow” light on the keypad of the plotter, call customer service ASAP. For a list of all other L.E.D. codes see “L.E.D. codes for the P-600” in chapter 4.

Bill of Materials for Unique 600Ae Components

This section contains bills of materials, assembly diagrams, and circuit schematics for all of the major components that are unique to the 600Ae. The following subsystem details are available:

- 600Ae Chassis (Internal) Assembly
- 600Ae Chassis (External) Assembly and Accessory Kit
- Carriage Assembly and Logic
- Main Logic Board Assembly

Accessory Kit - 600Ae

106874	600Ae Accessory kit

Ioline part Number	Description	Number of Parts used
106885	GUIDE, QUICK START,AE PLOTTERS	1
106884	CD-ROM, INSTALL, AE PLOTTERS	1
104366	WRENCH, ALLEN, .156, TEE	1
106570	CABLE, PARALLEL, 10 FT IEEE 1284B	1
104921	CABLE, RS-232, 15 FT	1
100150	CUTTER, PAPER	1
104352	BRUSH, GRIT SHAFT	1
104357	PEN, PRESSURIZED BALL POINT	1
105968	PEN, PILOT, V-BALL	1
104444	HUB FEED ASSY	2
106185	BELT, UNWINDING, 600/28	2
104362	STATIC GARLAND, 77.56 IN	2
105118	CABLE, SERIAL, 9F-25M PIN	1
107245	USER GUIDE, 601 SOFTWARE	1
101934	SCREW 1/4-20, 1.00 LG, BTN HD SOCK	5
106269	SCREW, #1/4-20, 2" LG	2
100059	SCREW #1/4-20, .625 LG, BTN HD SOCK	7
103764	BOX, SHIPPING, 9 X 7 X 5	1
106966	PACKING LIST, ACCY KIT, 600AE/28AE	1

Carriage Assembly Bill of Materials - 600Ae

107367	600Ae Carriage Assembly

Ioline part Number	Description	Number of Parts used
106863	BASE, CARRIAGE, I/S-600/28	1
106864	BRACKET, SENSOR, CARRIAGE, I/S-600	1
106464	BLOCK, SPACER, FLEXURE	1
106622	JAW, CARRIAGE, SC98	1
107208	BRACKET, CALIB CARRIAGE, I/S	1
106523	CLAMP, PEN/KNIFE, CARRIAGE	1
106772	CLAMP, PEN/KNIFE, MOLDED	1
106455	SPACER, MOUNT, VC, SC98	1
106949	DOWEL, PIN .0625DIA. X .625	1
106954	FILTER, SENSOR LENS	1
106869	PCB ASSY, CARRIAGE, I/S-600	1
106236	PCB ASSY, CARRIAGE, P600	1
106458	ARM, CARRIAGE, SC98	1
106460	MOUNT, VC, CARRIAGE, SC98	1
106230	WHEEL, CARRIAGE, SC98	3
106254	FLEXURE, CARRIAGE, Z-AXIS	2
103481	WSHR, .196ID, .312OD, .062TH, NYLON	1
106073	SCREW, SHOULDER, .187 DIA, .375 LG	2
106462	SPRING, EXTENSION, .25 OD, .037 DIA	1
107178	SPRING, EXT, .25 OD, .04 ID, 75 LG	1
106621	SPRING, COMP., .24 OD, 1.25 LG	1
106130	NUT, #10-32, ROUND THUMB	1
103726	TYRAP, .1 IN X 3 IN, BLACK	4
106115	SPACER, .188 ID, .313 OD, .188 LG	1
100705	PAD, PEN CAP, 1/4 DIA	1
106750	CAP, VINYL, .093 ID, BLK	1
106457	PLATE, FLEXURE	2
106526	SCREW, SHOULDER, .187 DIA, .5625 LG	1
107058	BRACKET, SENSOR, TUBE	1
106094	WASHER, SPRING, .193 ID, .370 OD	3
107014	SHAFT, CLAMP STOP, CARRIAGE	1
107274	WSHR, .5 OD, .145 ID, .010 T, PTFE	1
106314	SCREW, #4-40, .25 LG, PHP, NYLON	3
107330	SPRING, EXT, .185 OD, .013D, .632LG	1
107331	JAW, CARRIAGE, MOLDED CLAMP, I/S	1
107206	PLATE, CALIBRATION, CARRIAGE, I/S	1
107278	SCREW, #4-40, 1.25 LG, PHP, SS	1
106528	TAPE, DOUBLE COATED, 1.25 W	0.9
107332	SCREW, #6-32, FLAT HEAD, SOCKET,BLK	1
101860	SCREW #2-56, .312 LG, PHP	3
106626	WSHR, .195 ID, .245OD, .02 THK	3
106530	WSHR, .195 ID, .245 OD, .03 THK	3
106524	SCREW, #10-32, 2.OO LG, BHCS	1
106777	SCREW, THUMB, #10-32, 1.33 LG	1
106307	SCREW, #6-32, 1.25" LG, BHCS	4
104337	SCREW #4-40, .375 PHP, SEMS	2

Carriage Assembly Bill of Materials - 600Ae (Cont...)

104560	SCREW #4-40, .250 PHP, SEMS	2
106527	SCREW, #6-32, .312 LG,FHP, BLK	3
103896	WSHR, #2, FLAT, STEEL	3
106625	NUT, #6-32, HEX, SMALL PATTERN	2
106532	NUT, #6-32, HEX, NYLOCK	1
104471	TAPE, UHMW, .43 WIDE	0.25
106528	TAPE, DOUBLE COATED, 1.25 W	2.75
106358	TAPE, DOUBLE COATED, .5 IN WIDE	1
107018	SCREW, #6-32, .625 LG, FHP	2
107381	SCREW, #6-32, 1.0 LG, FHP	1
107018	SCREW, #6-32, .625 LG, FHP	0.625

Carriage PCB Assembly - 600Ae

106236	600Ae Cariage PCB assy

Ioline part Number	Description	Number of Parts used
105966	PCB, CARRIAGE, 28/600	1
106385	PCB, CARRIAGE	1
102624	CONN, FLEX CABLE, 12 PIN, R ANGLE	1
103726	TYRAP, .1 IN X 3 IN, BLACK	1
104646	VOICE COIL	1
105691	WAND, FRAME SENSOR, W\A	1
100237	CONN, TERMINAL, RING, #4, 22-18 GA,	1
106332	CABLE ASSY, 3" WITH LUG	1
100223	WIRE 22 GA ST GN X 3 IN, UL1007/10	1
101370	HEATSHRINK, .250 DIA, BLK	0.5
101369	HEATSHRINK, .125 DIA, BLK	0.25

PCB Assembly - 600Ae

107386	600Ae PCB Assembly

Ioline part Number	Description	Number of Parts used
107384	PCB ASSY, LOGIC, 68331, 600/28AE	1
106783	DATA IMAGE, 600AE	1

FGI Level - 600Ae

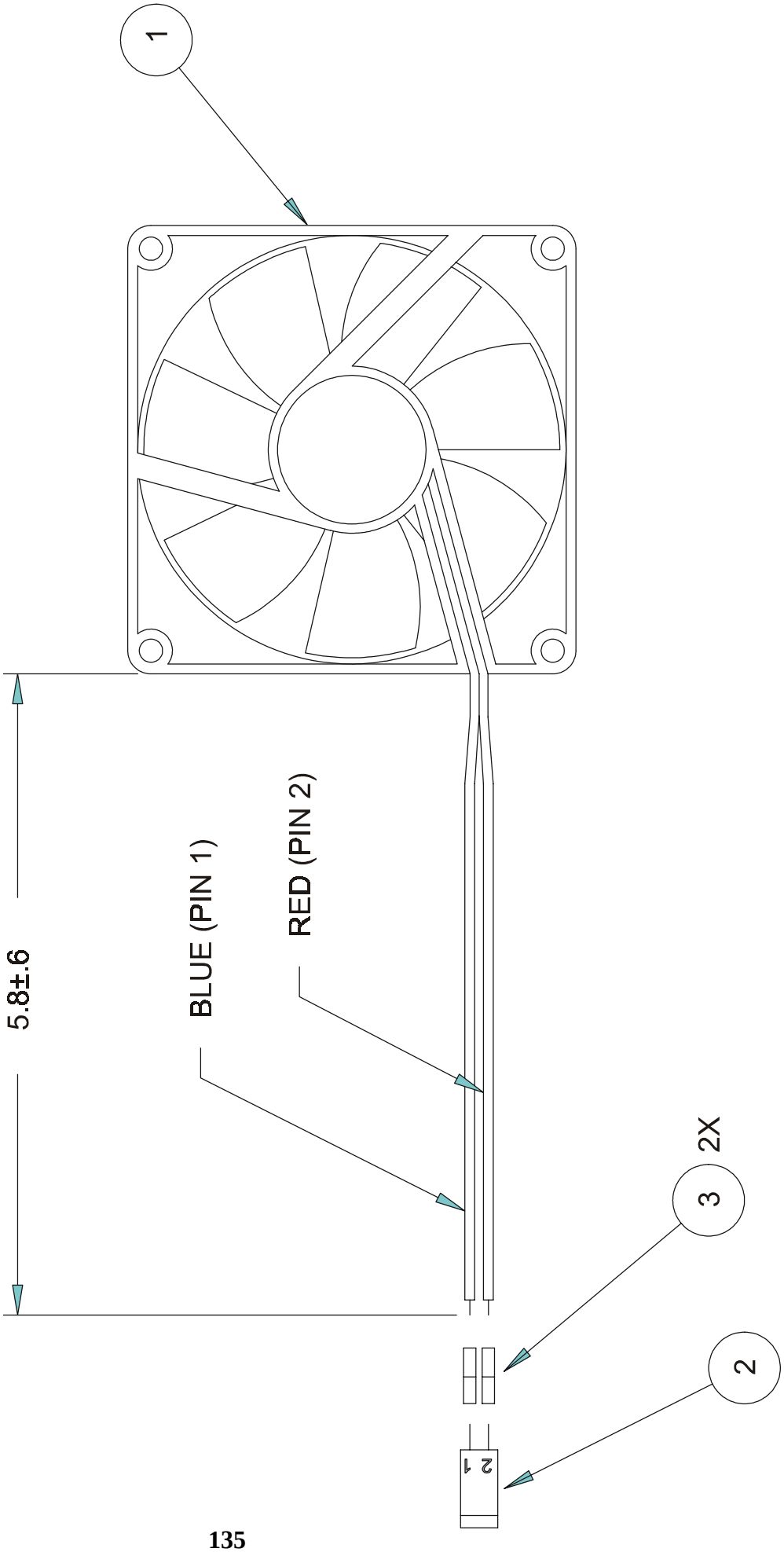
106850	600Ae FGI Level

Ioline part Number	Description	Number of Parts used
106852	CHASSIS, I/S 600AE	1
106174	CROSSMEMBER, 600/28	1
106877	LEG ASSY, RIGHT, I/S-600	1
106878	LEG ASSY, LEFT, I/S-600	1
105167	COVER, RIGHT END, S88	1
105166	COVER, LEFT END, S88	1
106270	FLANGE ASSY, TAKEUP, 600	2
106264	SHAFT ASSY, FEED, 600	1
106263	SHAFT ASSY, TAKEUP, 600	1
106244	DANCER BAR ASSY, FRONT P600	1
106245	DANCER BAR ASSY, REAR, P600	1
106243	COVER ASSY, TAKE UP, P600	1
106886	BOX, SHIPPING, I/S-600/28	1
106284	BOX, SHIP, 600/28	1
106962	PACKING LIST, 600AE	1
106874	ACCY KIT, 600AE/28AE	1
105969	KEY, TAKE UP, 600/28	1
101031	FOAM BLOCK, 2 IN X 2 IN X 2 IN	2
106887	LABEL, CARTON, END, I/S 600/28AE	2
103560	LABEL, SHIPPING CARTON, IOLINE, 20	2
105762	LABEL, REAR PANEL, FCC/CE	1
106018	LABEL, FRONT, P600	1
107114	LABEL, FRONT, LIGHT GRAY	1
106081	LABEL, WARNING, HAZARD, VOLTAGE	1
104926	STANDOFF, #8-32, 5.25 LG	2
104725	STANDOFF, #8-32, 1.75 LG	2
106241	WSHR,#8-32,.190 ID,.416 OD,.080THK	8
101581	SCREW #8-32, .375 FHP, BLACK	6
106334	SCREW #1/4-20, .375 LG, SET, CUP	1
104013	NUT, #8-32, KEP	4
106339	STRAIN RELIEF, PLASTIC, .30-.35 ID	1
100278	TYRAP, .15 IN X 9 IN	1
107101	COVER, CARRIAGE, I/S-600	1
106620	SCREW, #6-32, .25LG, PHP, BLACK	2
107218	LEG ASSY, RIGHT, 600/28AE	1
107219	LEG ASSY, LEFT, 600/28AE	1
107233	TAKE-UP ASSY, RIGHT, 600AE	1
107234	TAKE-UP ASSY, LEFT, 600AE	1
100113	NUT, #1/4-20, HEX, NYLOC	4
104008	SCREW #8-32, .375 LG, PHP SEMS	4

Appendix of Drawings *For the P-600, 600H, & 600Ae*

Fan Assembly

Part Number: 104745

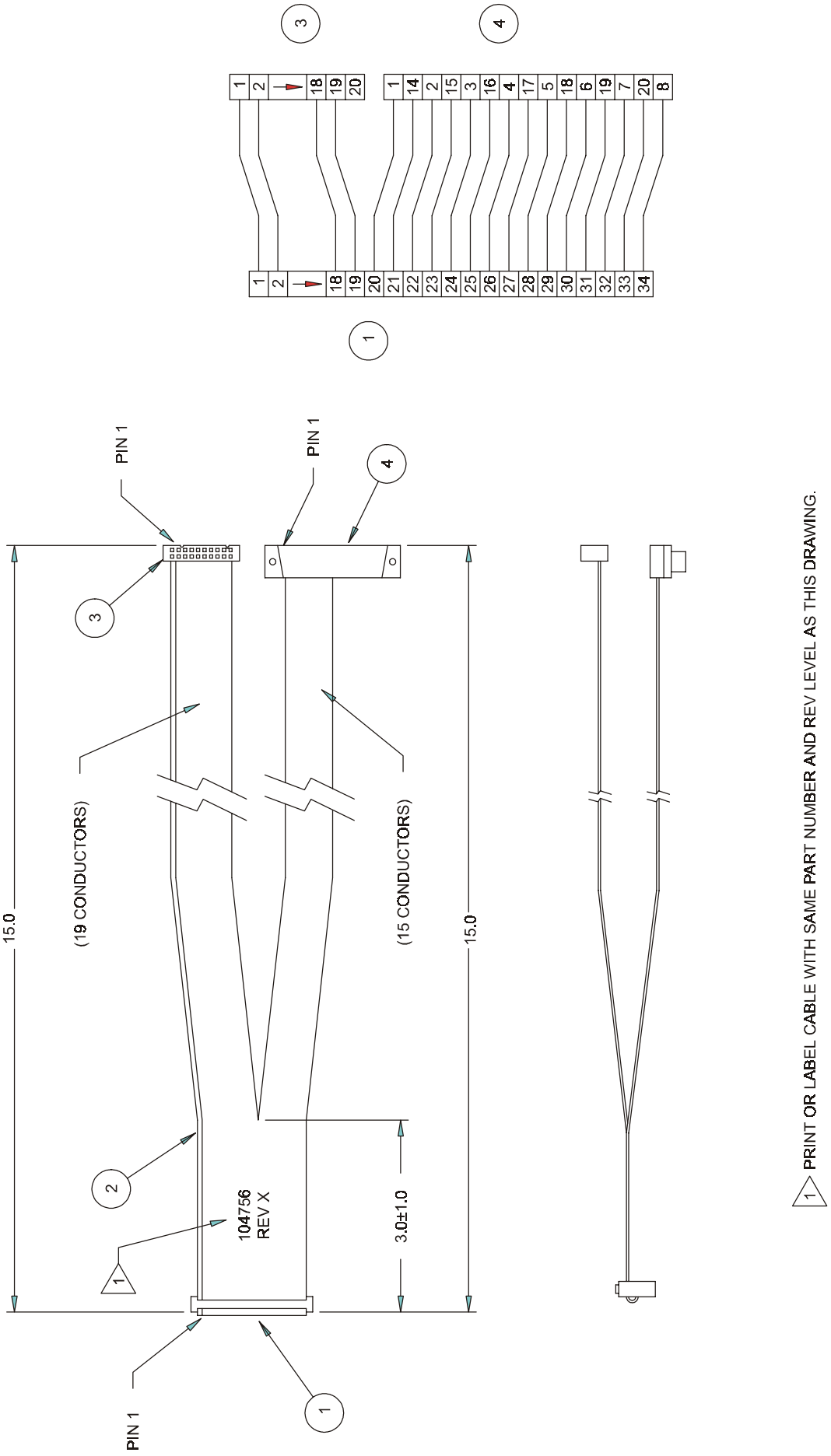


Fan Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
104744	FAN, 24 VDC	1
103022	CONN, HSG, 2 PIN, 1 X 2, FEMALE	2
100284	CONN, CRIMP, INSERT, 18-24 GA, .156	3

Cable Assembly

Part Number: 104756

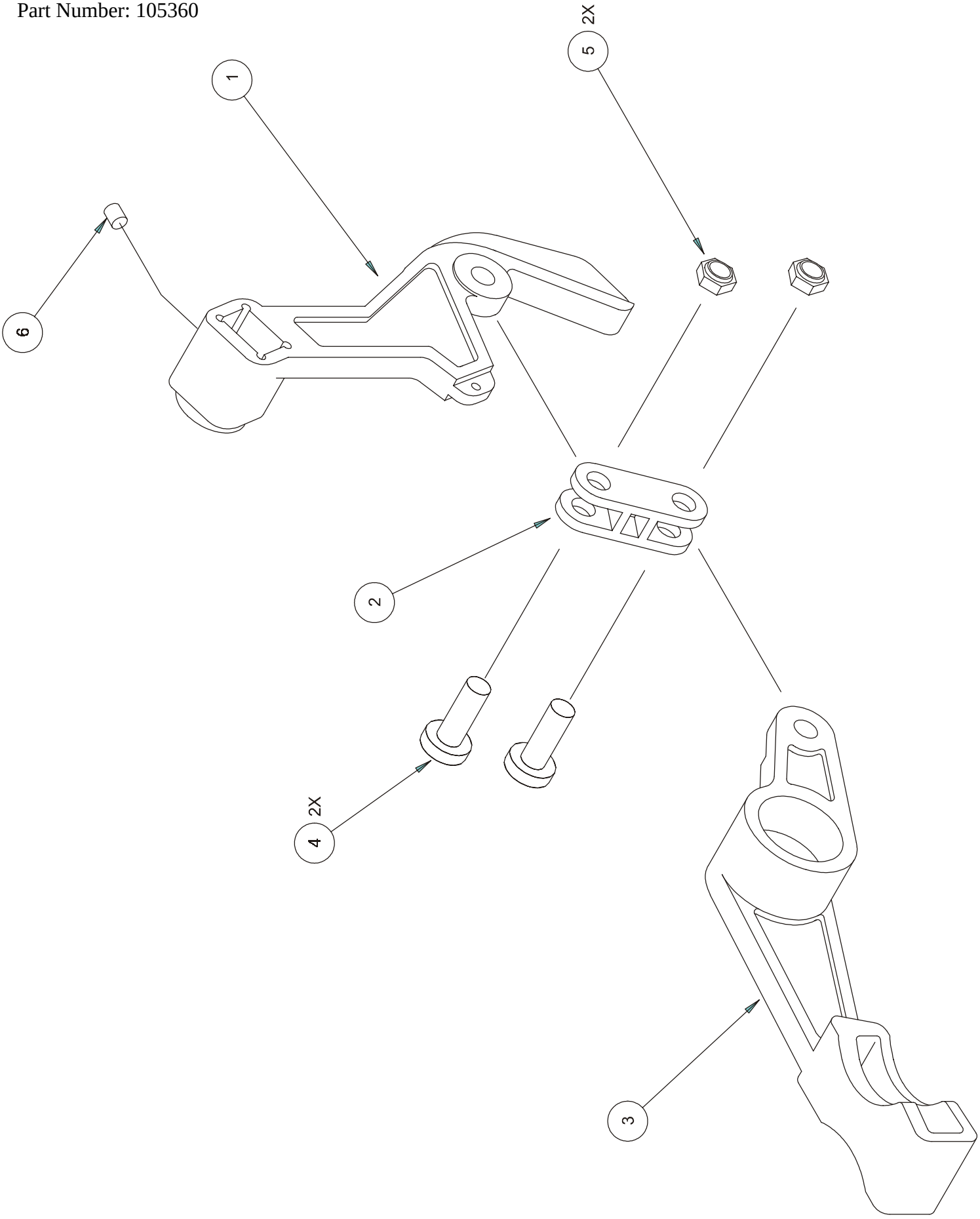


Cable Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
102896	CONN, RIBBON CABLE, 34 PIN, FEMALE	1
104324	CABLE, FLAT, 28 GA, 34 COND	2
104737	CONN, RIBBON CABLE, 20 PIN	3
104738	CONN, RIBBON CABLE, DB25, SK	4

Pinch Wheel Assembly - *(P-600 only)*

Part Number: 105360

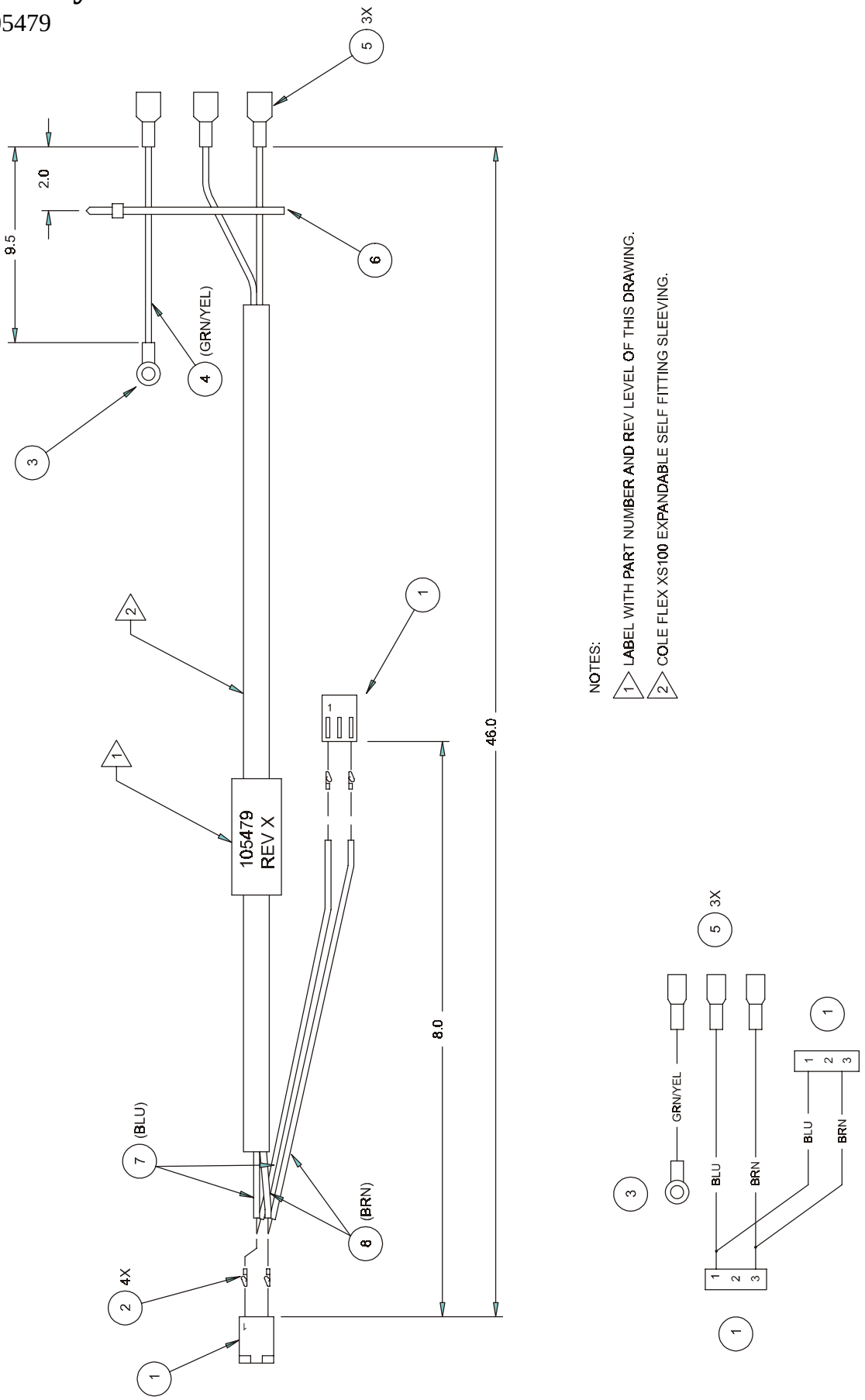


Pinch Wheel Assembly Bill of Materials (P-600 only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
105358	LEVER, PINCH WHEEL	1
105464	LEVER, PINCH WHEEL, MOLDED	1
105804	LEVER, PINCH WHEEL, MACHINED	1
105359	LINK, PINCH WHEEL	2
105463	LINK, MOLDED	2
105363	HANDLE, PINCH WHEEL	3
105465	HANDLE, PINCH WHEEL, MOLDED	3
105361	RING, PUSH-ON, .250	4
105362	PIN, CLEVIS, 1/4 X 3/4	5
105812	SCREW, #1/4-20 X .75 LG, PHP	4
106176	SCREW, 1/4-20 1" LONG THP	4
105813	NUT, #1/4-20, HEX	5
100113	NUT, #1/4-20, HEX, NYLOC	5
100037	SCREW #8-32, .187 LG, SH SET, CUP	6

Cable Assembly

Part Number: 105479

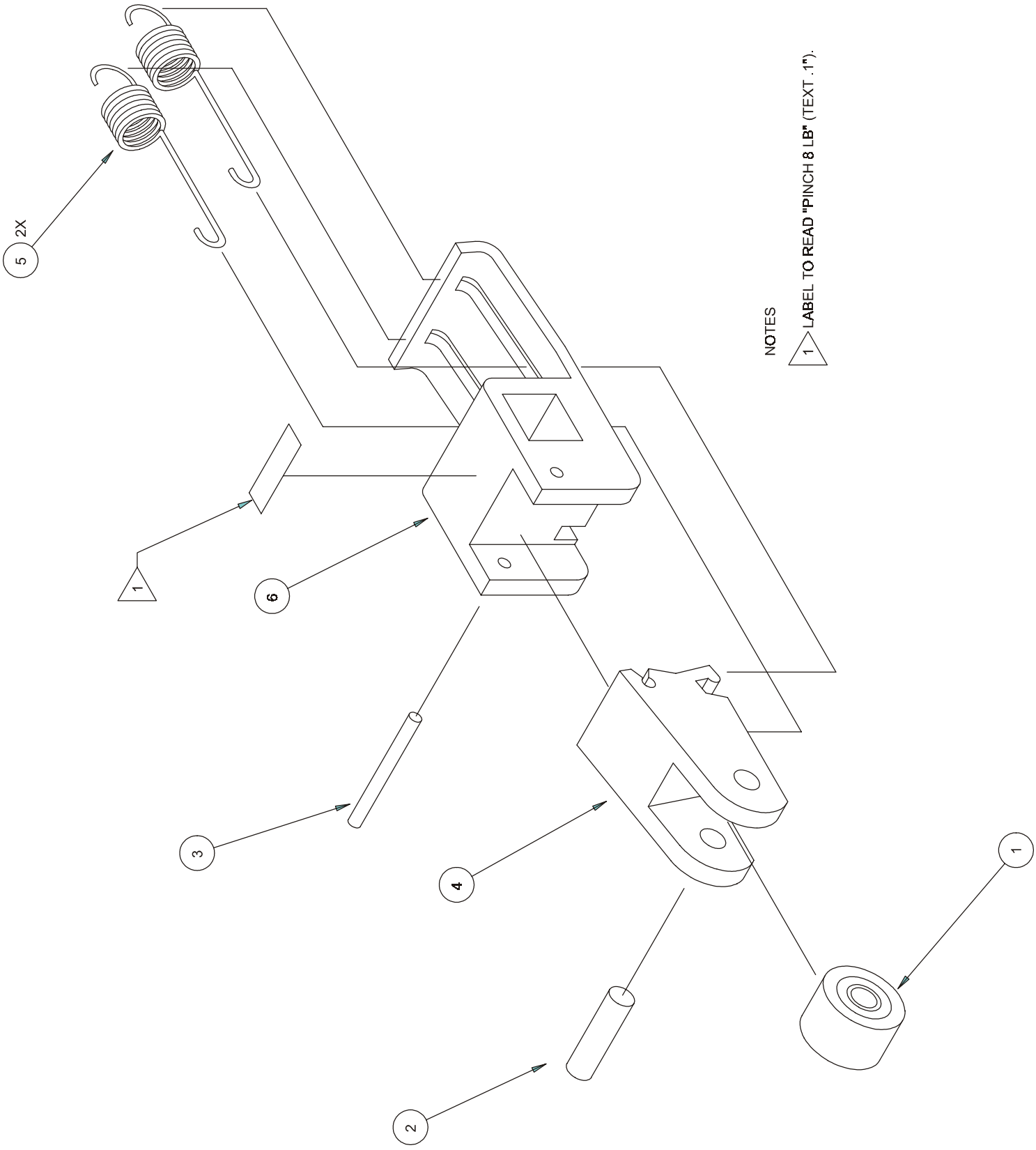


Cable Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
100251	CONN, HSG, 3 PIN, 1 X 3, FEMALE	1
100284	CONN, CRIMP, INSERT, 18-24 GA, .156	2
100247	CONN, TERMINAL, RING, #8, 22-16 GA	3
104343	WIRE 18 GA ST GRN/YEL	4
100242	CONN, TERMINAL, .187, 18-22GA, INSU	5
100243	CONN, TERMINAL, .250, 18-22GA, INSU	5
100277	TYRAP, .1 IN X 3 IN	6
104348	WIRE, 18 GA ST, BLU	7
104341	WIRE 18 GA ST BRN	8

Pinch Wheel Assembly - *(P-600 only)*

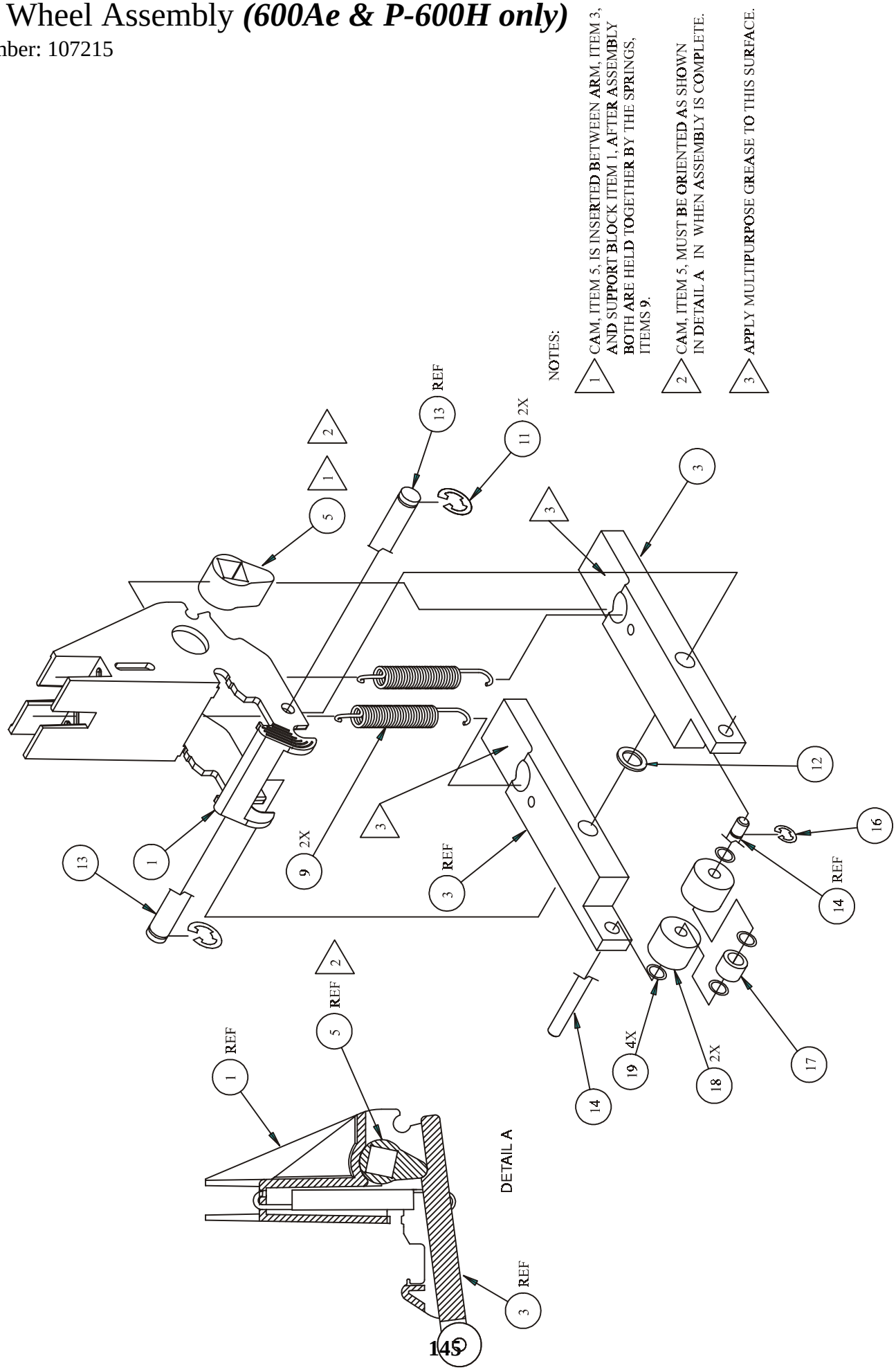
Part Number: 105568



Pinch Wheel Assembly Bill of Materials (P-600 only)

Pinch Wheel Assembly ***(600Ae & P-600H only)***

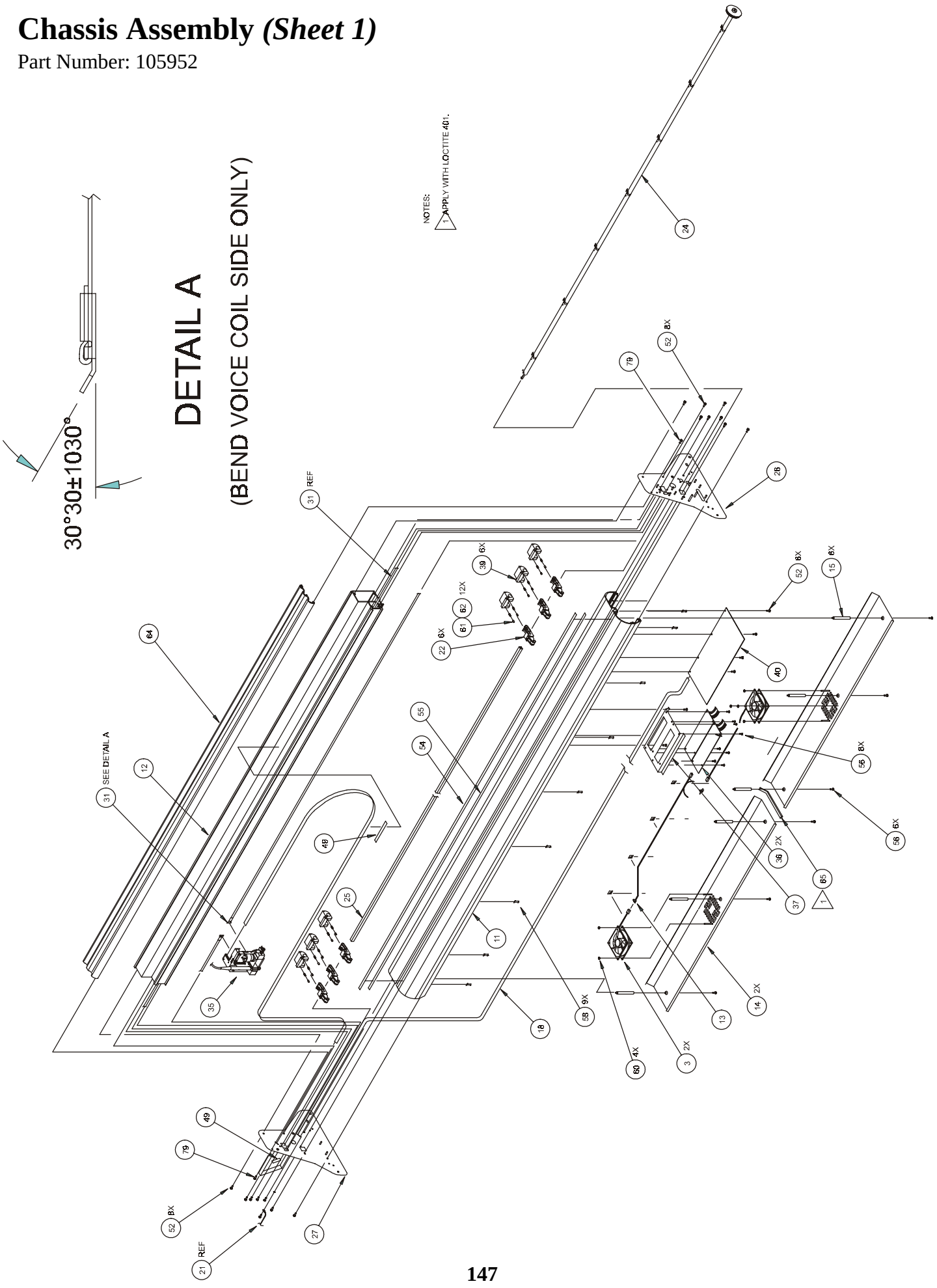
Part Number: 107215


NOTES:
1 CAM, ITEM 5, IS INSERTED BETWEEN ARM, ITEM 3, AND SUPPORT BLOCK ITEM 1, AFTER ASSEMBLY BOTH ARE HELD TOGETHER BY THE SPRINGS, ITEMS 9.
2 CAM, ITEM 5, MUST BE ORIENTED AS SHOWN IN DETAIL A IN WHEN ASSEMBLY IS COMPLETE.
3 APPLY MULTIPURPOSE GREASE TO THIS SURFACE.
DETAIL A
REF
2X
4X

Pinch Wheel Assembly (600Ae & P-600H only) Bill of Materials

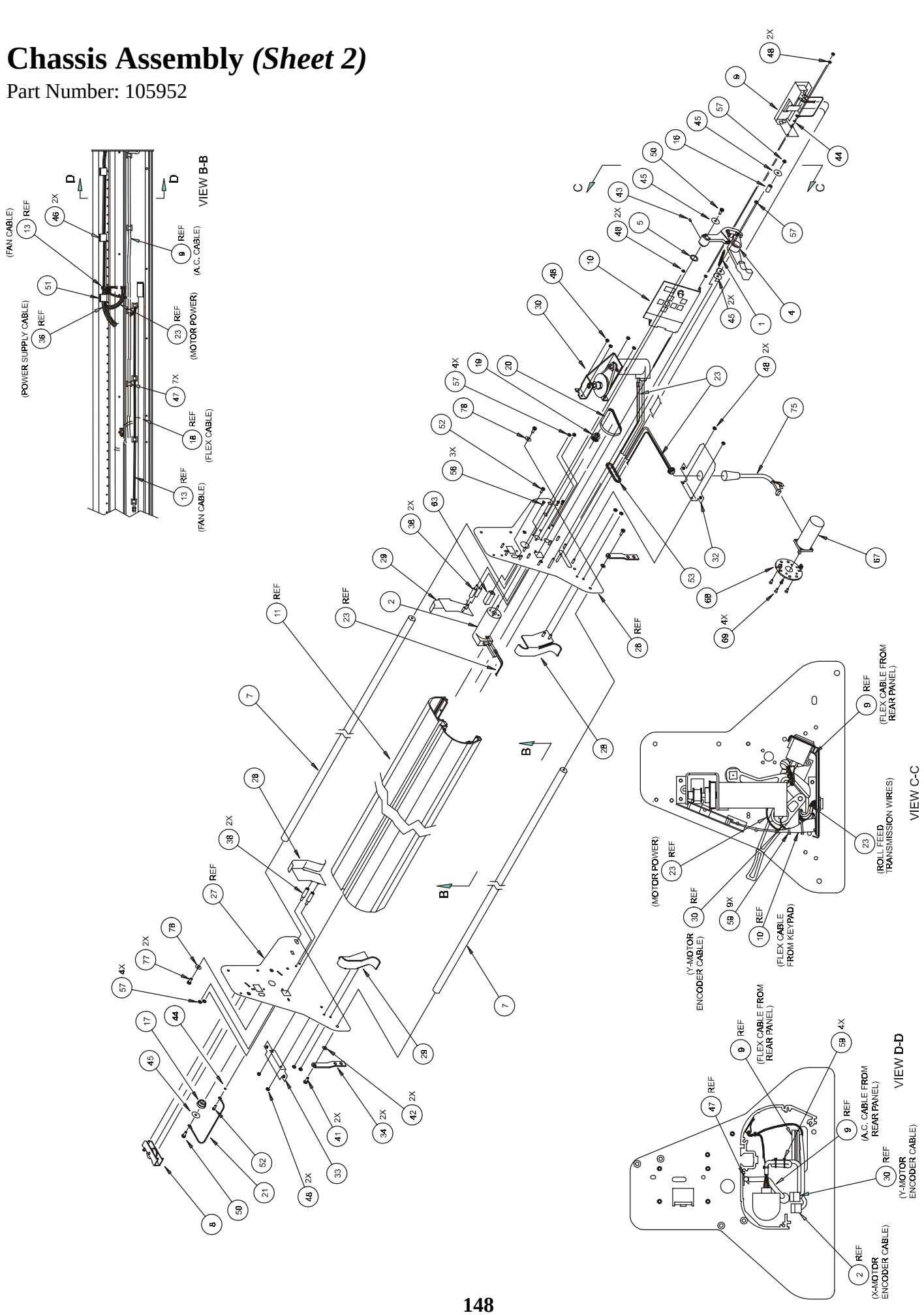
Chassis Assembly *(Sheet 1)*

Part Number: 105952



Chassis Assembly *(Sheet 2)*

Part Number: 105952



Chassis Assembly Bill of Materials - (P-600 only)

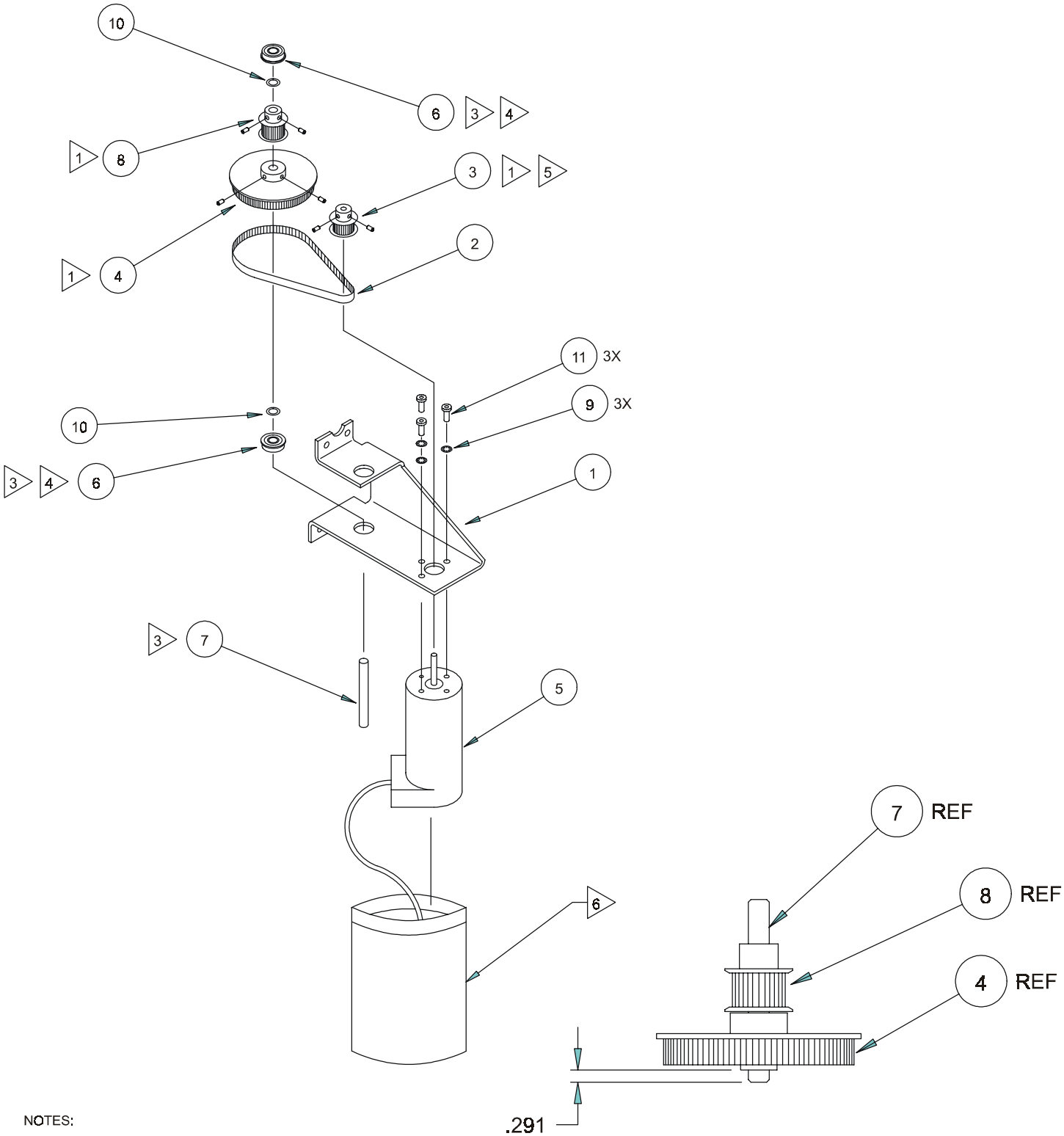
COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
104291	SPRING, EXTENSION	1
104745	FAN ASSY, W/ CABLE	3
105958	PINCH LEVER BUSHING	5
105957	WSHR, #10, 1.21 OD, .135 THK	6
106183	TENSIONER ASSY, 600	8
106171	REAR PANEL ASSY, 600	9
106170	KEYPAD ASSY, 600/28	10
106207	CABLE ASSY, 2 FAN ADAPT, SUMMIT 97	13
104381	BUSHING, SQUARE SHAFT	17
104636	PULLEY, 24T X .080 X 1/4	19
104733	BELT, .080 X 1/4 X 130T	20
104955	CABLE ASSY, GROUND	21
105568	CHART WHEEL ASSY, SUMMIT	22
105430	CABLE ASSY, MOTOR POWER	23
106290	CABLE ASSY, TU & POWER, INT	23
105963	CHANNEL, RIGHT, FRONT, SUMMIT 97	28
105964	CHANNEL, LEFT, FRONT, SUMMIT 97	29
106231	PLATE, CAP, RIGHT, P600	32
106232	PLATE, CAP, LEFT, SUMMIT 97	33
106233	BRACKET, HINGE, SUMMIT 97	34
106235	CARRIAGE ASSY, 600	35
105406	PLATE, POWER SUPPLY, 2200	37
106237	SUPPORT, SQUARE SHAFT, P600	39
105988	RIVET, DRIVE, 5/32 X 7/32	60
106293	ROD, NYLON, .187 OD, .5 LG	61
106295	SPRING, COMP., .180 OD, .69 LG	62
106297	STOP, CARRIAGE	63
106315	COVER, CARRIAGE, P600	66
106271	PLANETARY GEARMOTOR	67
106435	MOTOR, GEAR, PLANETARY, 12V, LATCH	67
106300	PLATE, ADJ, PLANETARY MOTOR	68
106294	REWORK ASSY, SPUR GEAR MOTOR	70
106298	PLATE, ADJ, SPUR GEAR MOTOR	71
106299	BRKT, TAKE UP COVER	72
104012	NUT, #6-32, KEP	73
105086	SCREW #10-32, .50 LG, FHP	74
106288	CABLE ASSY, TAKE UP, EXTERNAL	75
106434	CABLE ASSY, TAKE-UP, EXT, LATCH	75
105930	LABEL, WARNING, CRUSH HAZARD	76
105812	SCREW, #1/4-20 X .75 LG, PHP	77
106186	WASHER, .265 ID, .625 OD	78
105987	STANDOFF, M/F #6-32, 3.25 LG	15
104293	SPACER, #10 X .312 X .50, SS	16
106239	STANDOFF, M/F, #10-32, 1.125LG, S97	38
100059	SCREW #1/4-20, .625 LG, BTN HD SOCK	41
101934	SCREW 1/4-20, 1.00 LG, BTN HD SOCK	41
102159	WSHR, .250ID, .500OD, .0626THK, FLA	42
100024	SCREW #6-32, .187 LG, SH SET CUP PO	43
100087	WSHR, #8, LOCK, EXT	44
100099	WSHR, #10, .875OD, .06TH, FLAT	45
100279	CONN, CABLE CLIP	46
103026	CONN, CABLE CLIP, .18 DIA	47
104013	NUT, #8-32, KEP	48
103740	TAPE, FOAM, .5 IN, .025 THICK	49

Cassis Assembly Bill of Materials (Cont...)

103772	SCREW #10-32, .625 LG, SHC, NYLOC	50
104152	CLIP, CABLE, .50 DIA	51
104180	SCREW, #8, .50 LG, SLF TAP, PHP, SE	52
104726	GROMMET STRIP, CONTINUOUS 7/64	53
104471	TAPE, UHMW, .43 WIDE	54
105073	TAPE, WHITE, .43 WIDE	55
104713	SCREW #6-32, .375, PHP SEMS	56
104717	NUT, #10-32, HEX, NYLOCK	57
102726	SETSCREW #10-32, .75 LG, STEEL	58
103027	TYRAP, .1 IN X 5 3/4 LG	59
106532	NUT, #6-32, HEX, NYLOCK	60
106274	SCREW, #6-32 X .375 LG, FHCS	69
106176	SCREW, 1/4-20 1" LONG THP	77
104590	SCREW #8, .50 LG, ST, FHP	79
104648	MOTOR, SERVO, 12V	2
105360	PINCH WHEEL LEVER ASSY	4
105929	TOP BAR ASSY, 600	7
106016	PLATEN, 600/28	11
106172	TRAVERSE, SUMMIT 97	12
106147	BOTTOM COVER, SUMMIT 97	14
105509	CABLE, FLEX, 12 COND., 2200	18
105739	GRIT SHAFT ASSY, 910/2200	24
106184	SHAFT, SQUARE, 600	25
105955	PLATE, END, RIGHT, P600	26
105956	PLATE, END, LEFT, P600	27
105954	TRANSMISSION ASSY, Y-DRIVE, 600,12V	30
106234	BELT ASSY, Y DRIVE, P600	31
104753	POWER SUPPLY	36
106238	PCB ASSY, P600, TESTED	40
106173	DUST COVER, FINISHED, 600/28	64
106355	STRIP, SEAL, RUBBER	65

“Y” Axis Transmission Assembly - *(P-600 only)*

Part Number: 105954



NOTES:

1. SECURE ALL PULLEY SET SCREWS WITH LOCTITE 222. BE SURE ONE SET SCREW IS AGAINST FLAT ON SHAFT.
3. CLEAN MATING SURFACES OF BEARINGS, ITEM 6, AND BRACKET, ITEM 1, WITH LOCTITE PRIMER N. SECURE BEARINGS TO PLATES WITH LOCTITE 609.
4. ADD A SMALL4 ADD A AMOUNT OF LOCTITE THREAD LOCKER 290 TO INNER RACE ID OF BEARINGS, ITEM 6. CAUTION: ID OF BEARINGS, ITEM 6. WIPE OFF ALL EXCESS LOCTITE. DO NOT ALLOW ANY TO GET INSIDE BEARING.
5. INSTALL PULLEY SO THAT THE GAP BETWEEN THE PULLEY FLANGE AND BRACKET IS .100±.010.
6. MOTOR, ITEM 5, IS STATIC SENSITIVE. COVER MOTOR AND CONNECTOR WITH 3 X 5 STATIC BAG AND SECURE WITH A RUBBER BAND.

CAUTION

SENSITIVE ELECTRONIC DEVICES

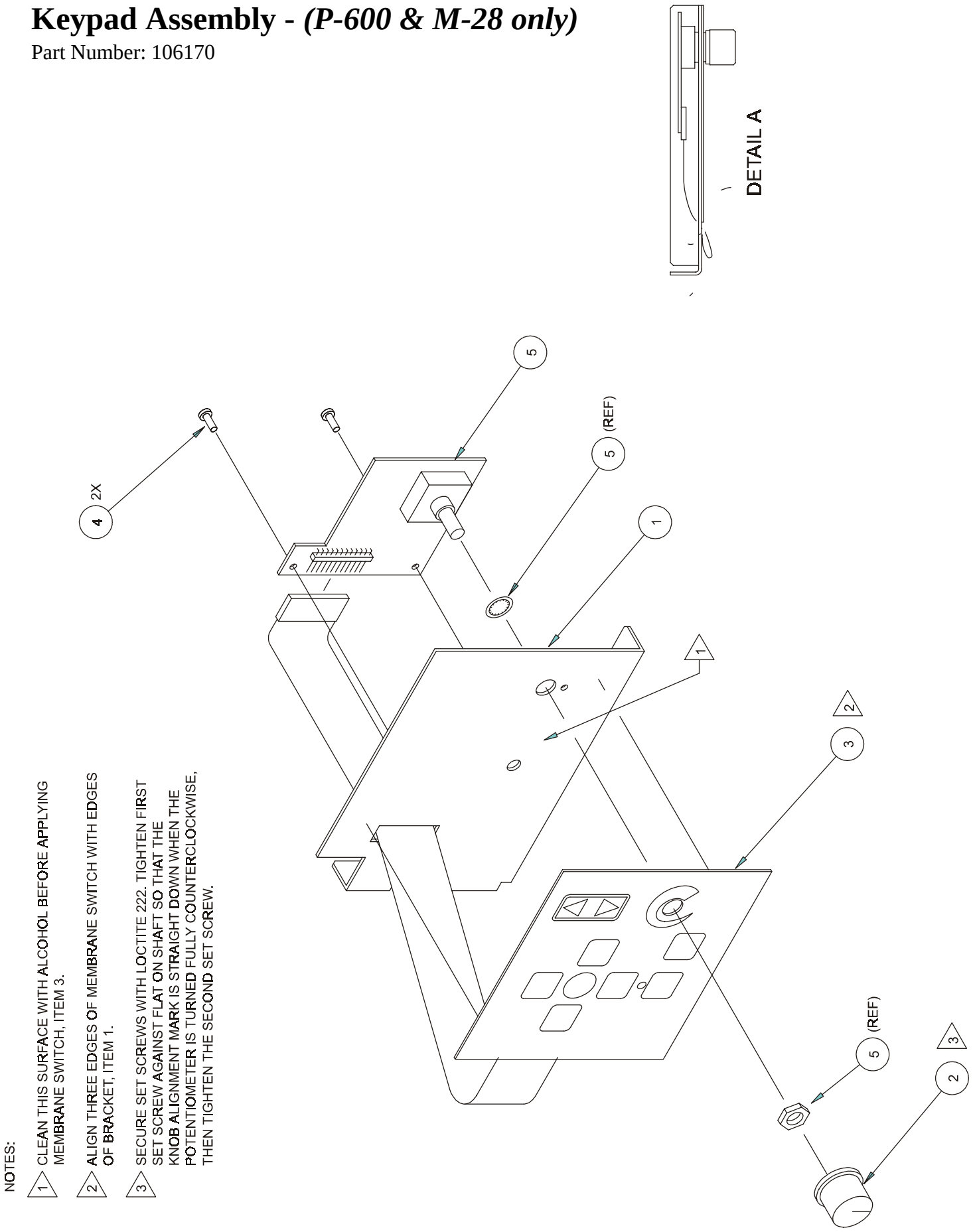
DO NOT SHIP OR STORE NEAR STRONG ELECTROSTATIC, ELECTROMAGNETIC, MAGNETIC OR RADIOACTIVE FIELDS

"Y" Axis Transmission Assembly Bill of Materials (P-600 only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
105935	BRACKET, Y TRANS, SUMMIT 97	1
105953	BELT, .080 X 1/4 X 110T	2
105933	PULLEY, 16T X .080 X 1/4	3
105934	PULLEY, 60T X .080 X 1/4	4
104648	MOTOR, SERVO, 12V	5
100317	BEARING, BALL, .25ID, .625OD, .196	6
104830	PIN, Y DRIVE	7
104730	PULLEY, .080 X 3/8 X 25T	8
100080	WSHR, #6, LOCK, EXT STAR	9
100111	SPACER, .254ID, .375OD, .030LG, GOL	10
104975	SCREW #6-32, .375 LG, BTN HD	11

Keypad Assembly - *(P-600 & M-28 only)*

Part Number: 106170

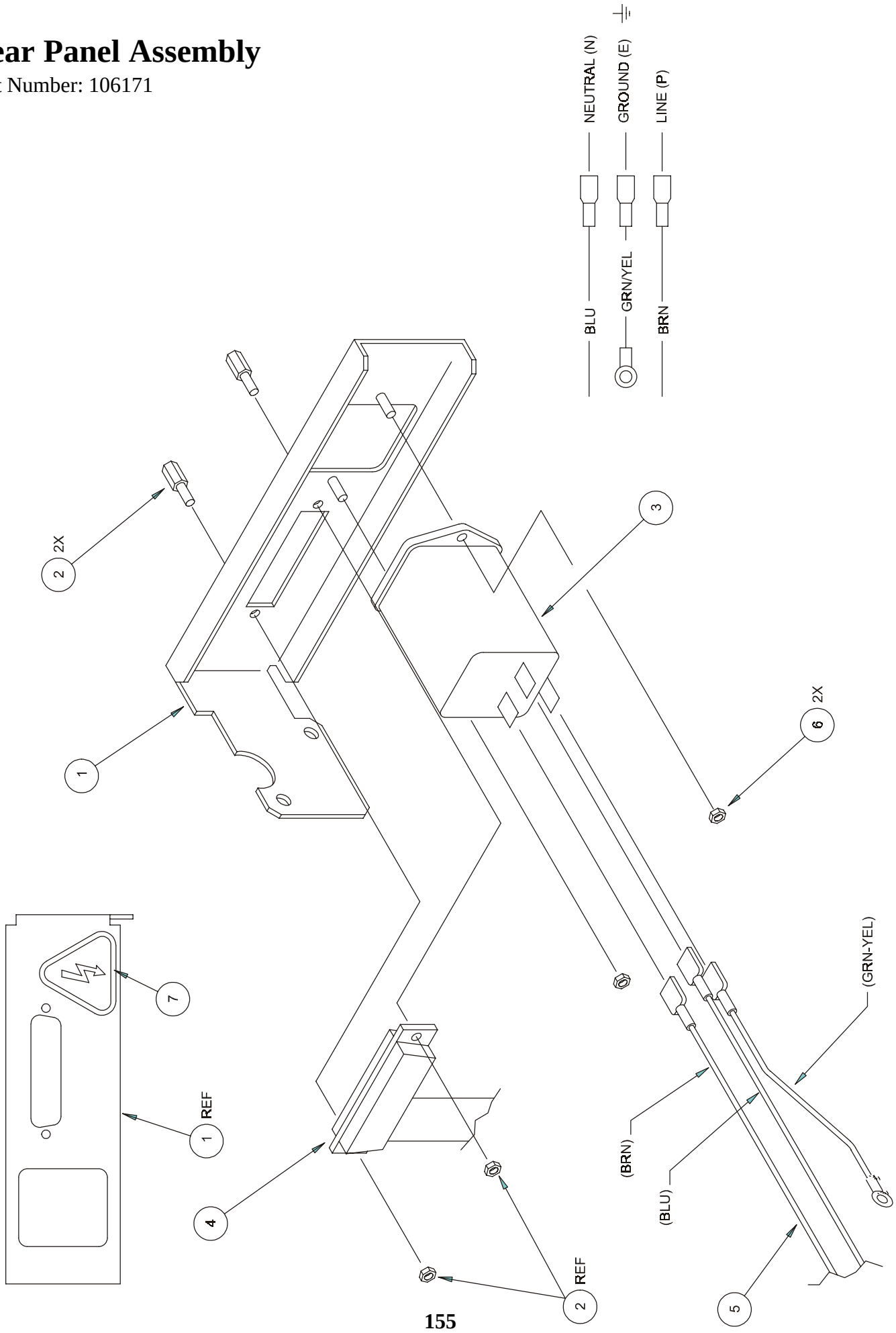

DETAIL A
4 2X
5
5 (REF)
1
1
2
3
5 (REF)
3
2
NOTES:
1 CLEAN THIS SURFACE WITH ALCOHOL BEFORE APPLYING MEMBRANE SWITCH, ITEM 3.
2 ALIGN THREE EDGES OF MEMBRANE SWITCH WITH EDGES OF BRACKET, ITEM 1.
3 SECURE SET SCREWS WITH LOCTITE 222. TIGHTEN FIRST SET SCREW AGAINST FLAT ON SHAFT SO THAT THE KNOB ALIGNMENT MARK IS STRAIGHT DOWN WHEN THE POTENTIOMETER IS TURNED FULLY COUNTERCLOCKWISE, THEN TIGHTEN THE SECOND SET SCREW.

Keypad Assembly Bill of Materials (P-600 & M-28 only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106020	BRACKET, KEYPAD, 600/28	1
104014	KNOB, BLACK, .25 SHAFT	2
106413	KNOB, BLACK, .6 X .77 OD, .25 SHAFT	2
105428	MEMBRANE SWITCH, 2200	3
106182	MEMBRANE SWITCH, SUMMIT 97	3
104337	SCREW #4-40, .375 PHP, SEMS	4
105427	PCB ASSY, KEYPAD, 2200	5

Rear Panel Assembly

Part Number: 106171

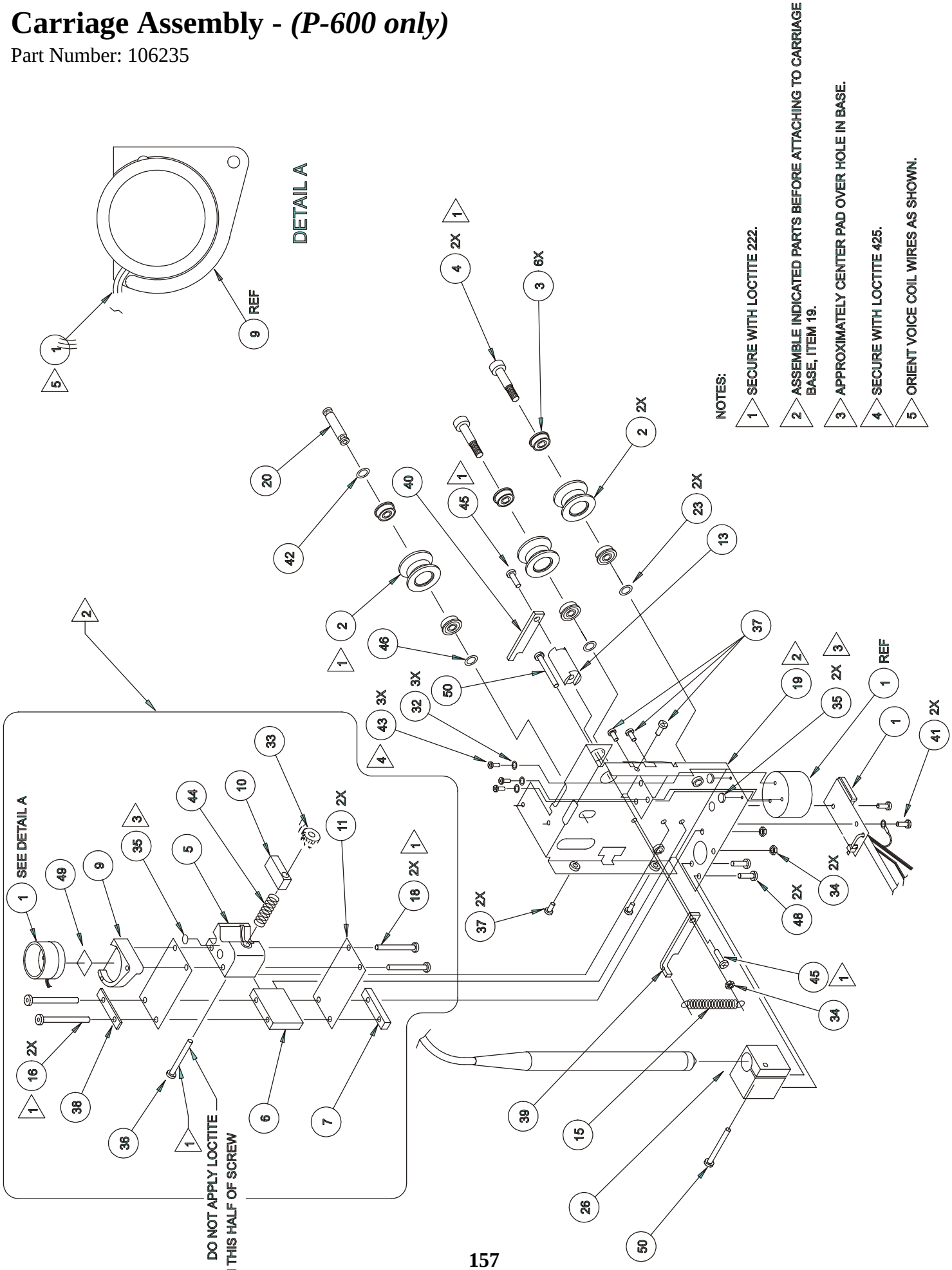


Rear Panel Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
105965	BRACKET, REAR I/O PANEL, 600/28	1
100121	JACK SOCKET KIT, #4-40	2
105684	RECEPTACLE/SWITCH, 2200	3
104756	CABLE ASSY, KEYPAD/RS-232	4
105479	CABLE ASSY, AC POWER, 2200	5
104011	NUT, #4-40, KEP	6
106081	LABEL, WARNING, HAZARD, VOLTAGE	7

Carriage Assembly - *(P-600 only)*

Part Number: 106235

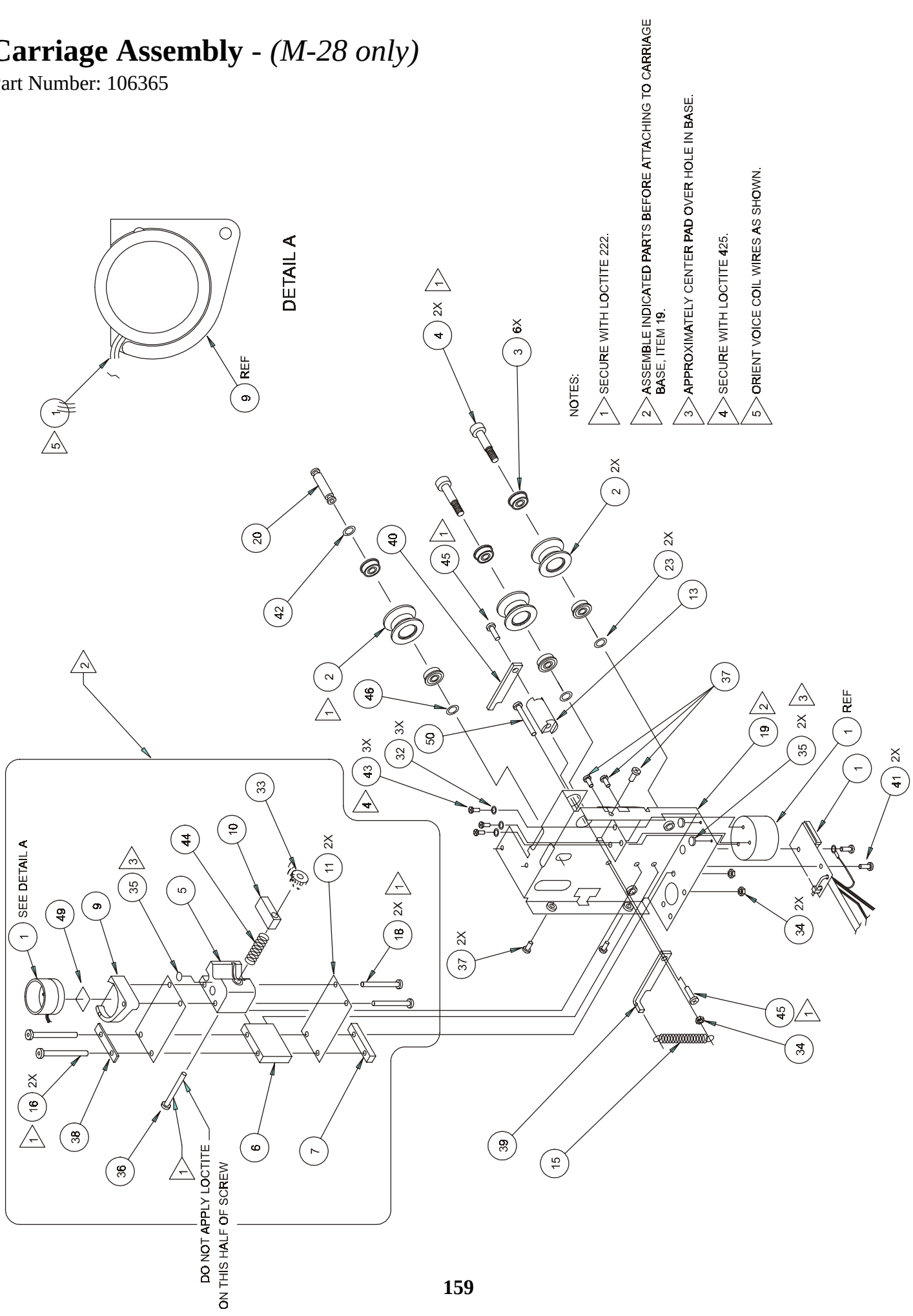

DETAIL A
REF
NOTES:
1 SECURE WITH LOCTITE 222.
2 ASSEMBLE INDICATED PARTS BEFORE ATTACHING TO CARRIAGE BASE, ITEM 19.
3 APPROXIMATELY CENTER PAD OVER HOLE IN BASE.
4 SECURE WITH LOCTITE 425.
5 ORIENT VOICE COIL WIRES AS SHOWN.
SEE DETAIL A
DO NOT APPLY LOCTITE ON THIS HALF OF SCREW

Carriage Assembly Bill of Materials (P-600 only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106236	PCB ASSY, CARRIAGE, P600	1
105435	WHEEL, CARRIAGE	2
102655	BEARING, FLANGE, .250ID, .500OD	3
105894	SCREW, SHOULDER, .250 DIA, .625LG	4
106246	JAW, CARRIAGE	5
106247	BLOCK, SPACER, CARRIAGE, Z-AXIS	6
106248	BLOCK, BASE, CARRIAGE, Z-AXIS	7
106250	MOUNT, VOICE COIL BOBBIN, CARRIAGE	9
106253	CLAMP, PEN, CARRIAGE	10
106254	FLEXURE, CARRIAGE, Z-AXIS	11
106310	SHAFT, SPRING RETAINER, CARRIAGE	12
106256	AXLE, LEVER, CARRIAGE	13
104717	NUT, #10-32, HEX, NYLOCK	14
106309	SPRING, EXTENSION, .300 OD, .049 D	15
106156	BASE, CARRIAGE	19
106311	AXLE, V-WHEEL, UPPER	20
106313	BUMPER, UP LIMIT, CARRIAGE	22
103390	WSHR, .195ID, .354OD, .032 THK, SS	23
106117	WASHER, .195 ID, .030 THK, SS	23
102027	SCREW #4-40, .50 LG, PHP	24
104011	NUT, #4-40, KEP	25
105438	CLAMP, SENSOR	26
106317	CLAMP, SENSOR, P600	27
106291	SPACER, SENSOR CLAMP	27
103908	SCREW #8-32, .50 LG, PHP SEMS	28
106315	COVER, CARRIAGE, P600	29
104975	SCREW #6-32, .375 LG, BTN HD	30
106221	WSHR, .25 ID, .375 OD, .03 THK	31
103896	WSHR, #2, FLAT, STEEL	32
106130	NUT, #10-32, ROUND THUMB	33
104012	NUT, #6-32, KEP	34
100705	PAD, PEN CAP, 1/4 DIA	35
106219	BLOCK, TOP, CARRIAGE	38
106216	LEVER, FRONT, CARRIAGE	39
106217	LEVER, REAR, CARRIAGE	40
103825	SPACER, SHAFT	42
106220	SPRING, COMPRESSION, .300 OD, .022D	44
100067	SCREW #8-32, .375 LG, PHP, BLK OXI	45
106308	SCREW, #10-32, 2" LG, PHP	8
106305	SCREW, #6-32, 1.5" LG, BHCS	16
106306	SCREW, #6-32, 0.25" LG, BHCS	17
106307	SCREW, #6-32, 1.25" LG, BHCS	18
106312	NUT, #6-32, HEX	21
103447	SCREW #10-32, 1.75 LG, BTN HD SOCKE	36
105065	SCREW #6-32, .25 LG, BTN HD	37
104337	SCREW #4-40, .375 PHP, SEMS	41
101860	SCREW #2-56, .312 LG, PHP	43
100111	SPACER, .254ID, .375OD, .030LG, GOL	46
106320	SCREW, #6, .375LG, SLF-TAP	48
106358	TAPE, DOUBLE COATED, .5 IN WIDE	49
106321	SCREW, #6-32, 1.0 LG, BHCS	50

Carriage Assembly - *(M-28 only)*

Part Number: 106365

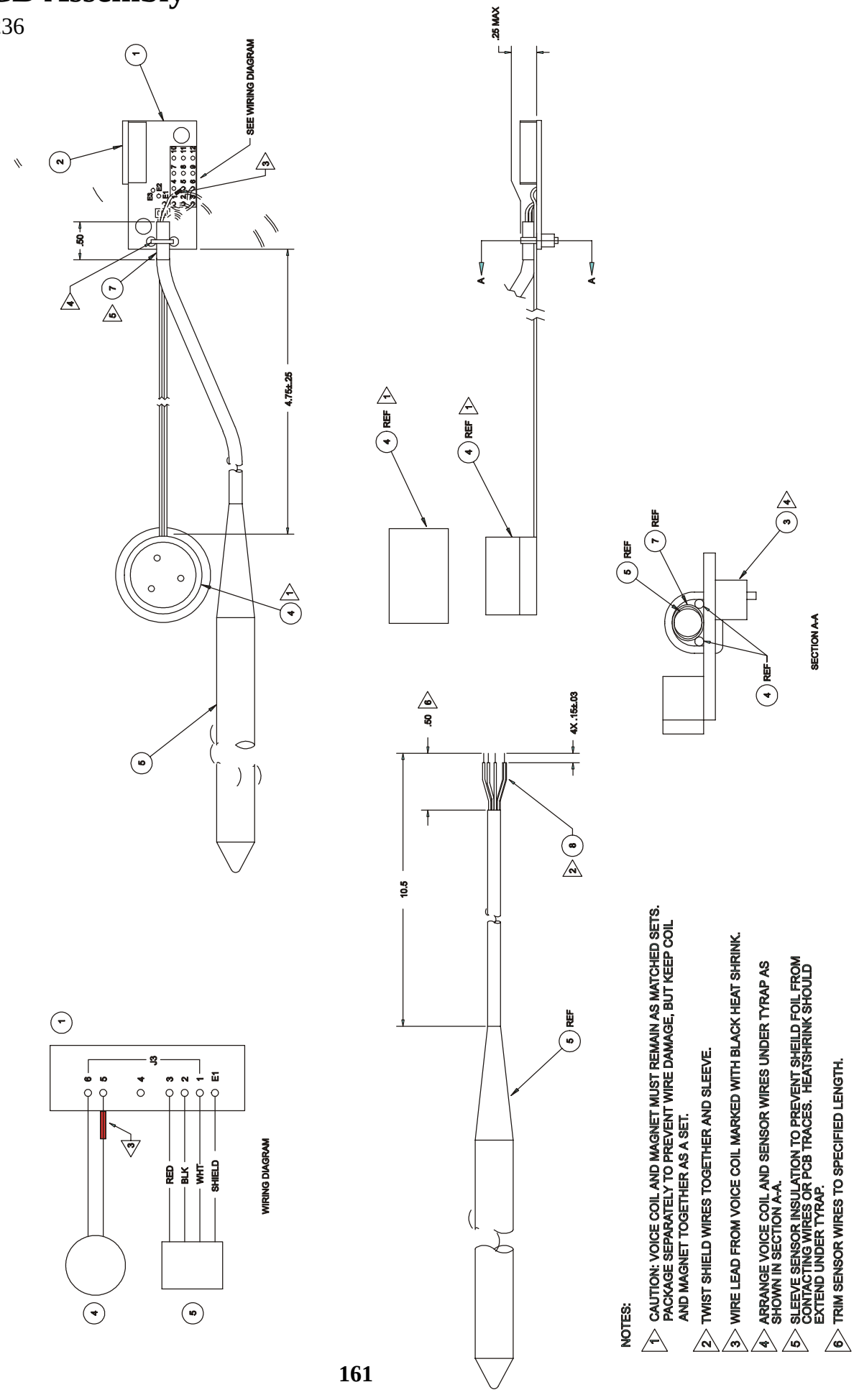

NOTES:
1 SECURE WITH LOCTITE 222.
2 ASSEMBLE INDICATED PARTS BEFORE ATTACHING TO CARRIAGE BASE, ITEM 19.
3 APPROXIMATELY CENTER PAD OVER HOLE IN BASE.
4 SECURE WITH LOCTITE 425.
5 ORIENT VOICE COIL WIRES AS SHOWN.
DETAIL A
SEE DETAIL A
DO NOT APPLY LOCTITE ON THIS HALF OF SCREW
REF

Carriage Assembly Bill of Materials - (M-28 only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106366	PCB ASSY, CARRIAGE, P28	1
105435	WHEEL, CARRIAGE	3
102655	BEARING, FLANGE, .250ID, .500OD	6
105894	SCREW, SHOULDER, .250 DIA, .625LG	2
106246	JAW, CARRIAGE	1
106247	BLOCK, SPACER, CARRIAGE, Z-AXIS	1
106248	BLOCK, BASE, CARRIAGE, Z-AXIS	1
106250	MOUNT, VOICE COIL BOBBIN, CARRIAGE	1
106253	CLAMP, PEN, CARRIAGE	1
106254	FLEXURE, CARRIAGE, Z-AXIS	2
106256	AXLE, LEVER, CARRIAGE	1
106309	SPRING, EXTENSION, .300 OD, .049 D	1
106156	BASE, CARRIAGE	1
106311	AXLE, V-WHEEL, UPPER	1
103390	WSHR, .195ID, .354OD, .032 THK, SS	2
104011	NUT, #4-40, KEP	2
103908	SCREW #8-32, .50 LG, PHP SEMS	1
103896	WSHR, #2, FLAT, STEEL	3
106130	NUT, #10-32, ROUND THUMB	1
104012	NUT, #6-32, KEP	3
100705	PAD, PEN CAP, 1/4 DIA	3
103447	SCREW #10-32, 1.75 LG, BTN HD SOCKE	1
106219	BLOCK, TOP, CARRIAGE	1
106216	LEVER, FRONT, CARRIAGE	1
106217	LEVER, REAR, CARRIAGE	1
103825	SPACER, SHAFT	1
106220	SPRING, COMPRESSION, .300 OD, .022D	1
100067	SCREW #8-32, .375 LG, PHP, BLK OXI	2
106358	TAPE, DOUBLE COATED, .5 IN WIDE	1
106305	SCREW, #6-32, 1.5" LG, BHCS	2
106307	SCREW, #6-32, 1.25" LG, BHCS	2
105065	SCREW #6-32, .25 LG, BTN HD	5
104337	SCREW #4-40, .375 PHP, SEMS	2
101860	SCREW #2-56, .312 LG, PHP	3
100111	SPACER, .254ID, .375OD, .030LG, GOL	1
106321	SCREW, #6-32, 1.0 LG, BHCS	1

Carriage PCB Assembly

Part Number: 106236

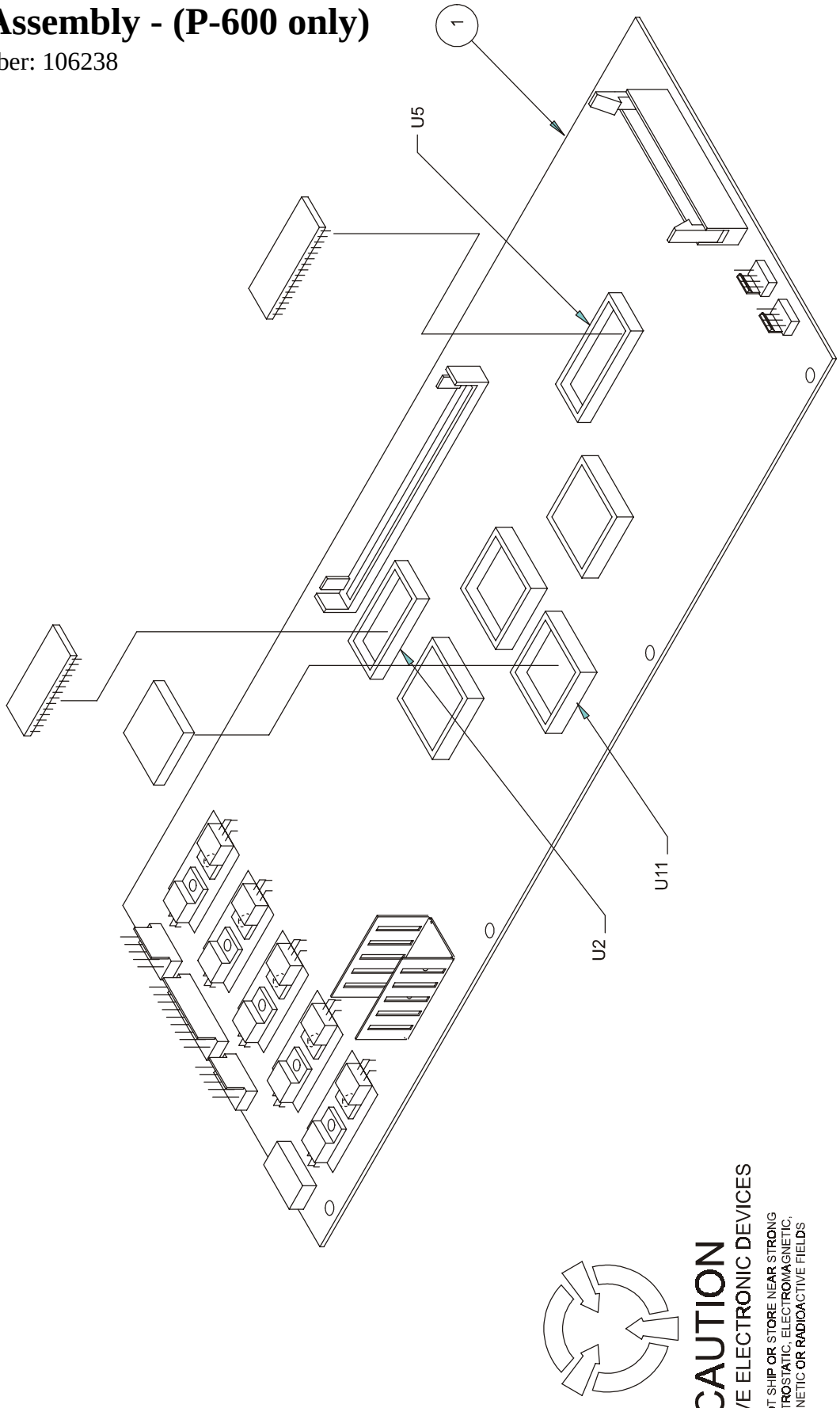


Carriage PCB Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
105966	PCB, CARRIAGE, 28/600	1
106385	PCB, CARRIAGE	1
102624	CONN, FLEX CABLE, 12 PIN, R ANGLE	2
103726	TYRAP, .1 IN X 3 IN, BLACK	3
104646	VOICE COIL	4
105691	WAND, FRAME SENSOR, W\A	5
100237	CONN, TERMINAL, RING, #4, 22-18 GA,	6
106332	CABLE ASSY, 3" WITH LUG	6
100223	WIRE 22 GA ST GN X 3 IN, UL1007/10	7
101370	HEATSHRINK, .250 DIA, BLK	7
101369	HEATSHRINK, .125 DIA, BLK	8

PCB Assembly - (P-600 only)

Part Number: 106238



CAUTION

SENSITIVE ELECTRONIC DEVICES

DO NOT SHIP OR STORE NEAR STRONG ELECTROSTATIC, ELECTROMAGNETIC, MAGNETIC OR RADIOACTIVE FIELDS

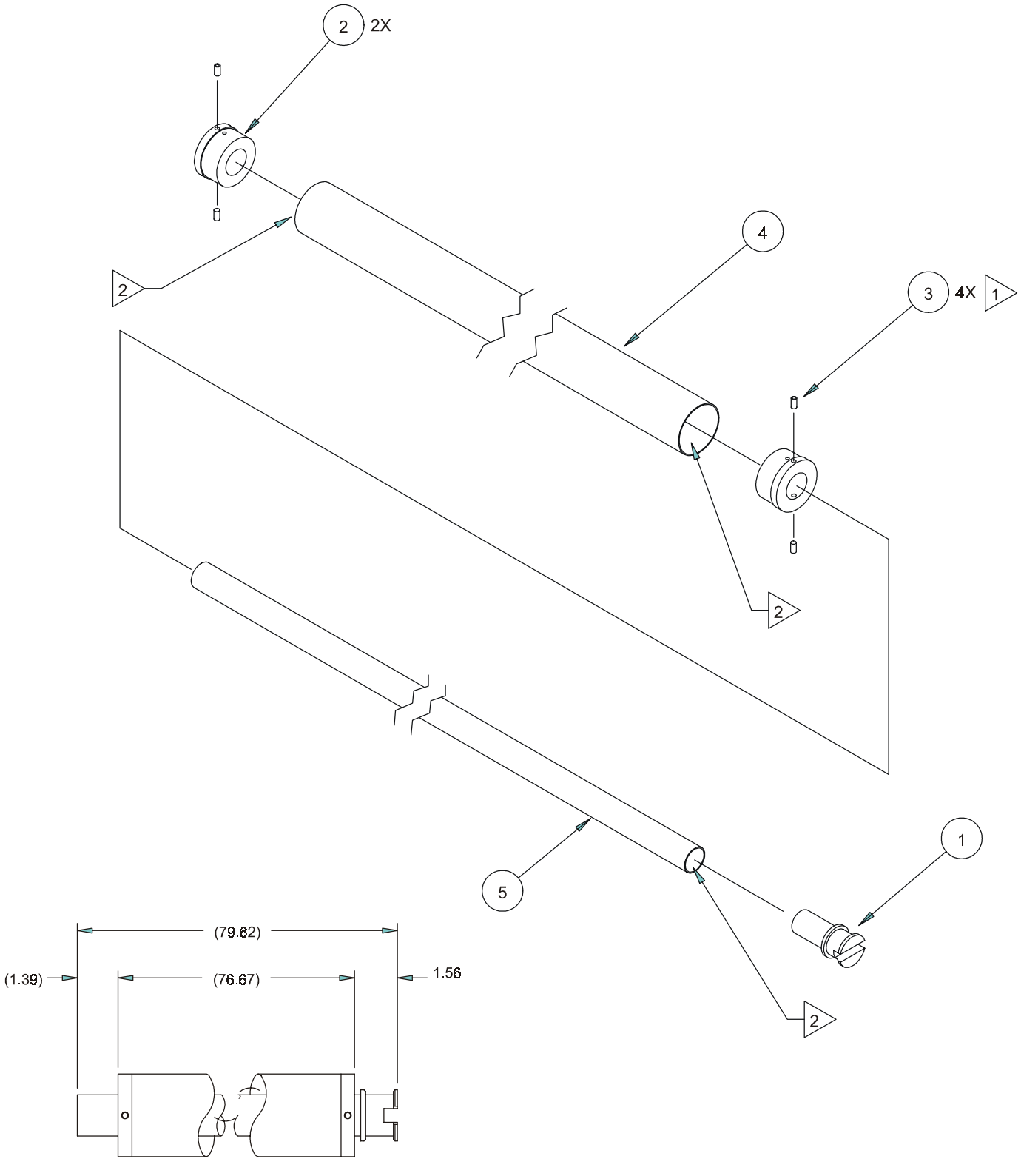
CAUTION: TO PREVENT DAMAGE TO ELECTROSTATIC SENSTIVE COMPONENTS, USE ANTI-STATIC PRECAUTIONS AND PLACE ASSEMBLED BOARD IN 12 X 16 STATIC BAG.

PCB Assembly Bill of Materials - (P-600 only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106240	IC, ROM, P600, PROG	0
105418	IC, ROM, DSP, 2200, PROG	0
105510	IC, FPGA, PROG, 1010B,2200/910	0
105419	PCB ASSY, LOGIC, 2200	1

Take-up Shaft Assembly

Part Number: 106263



NOTES:

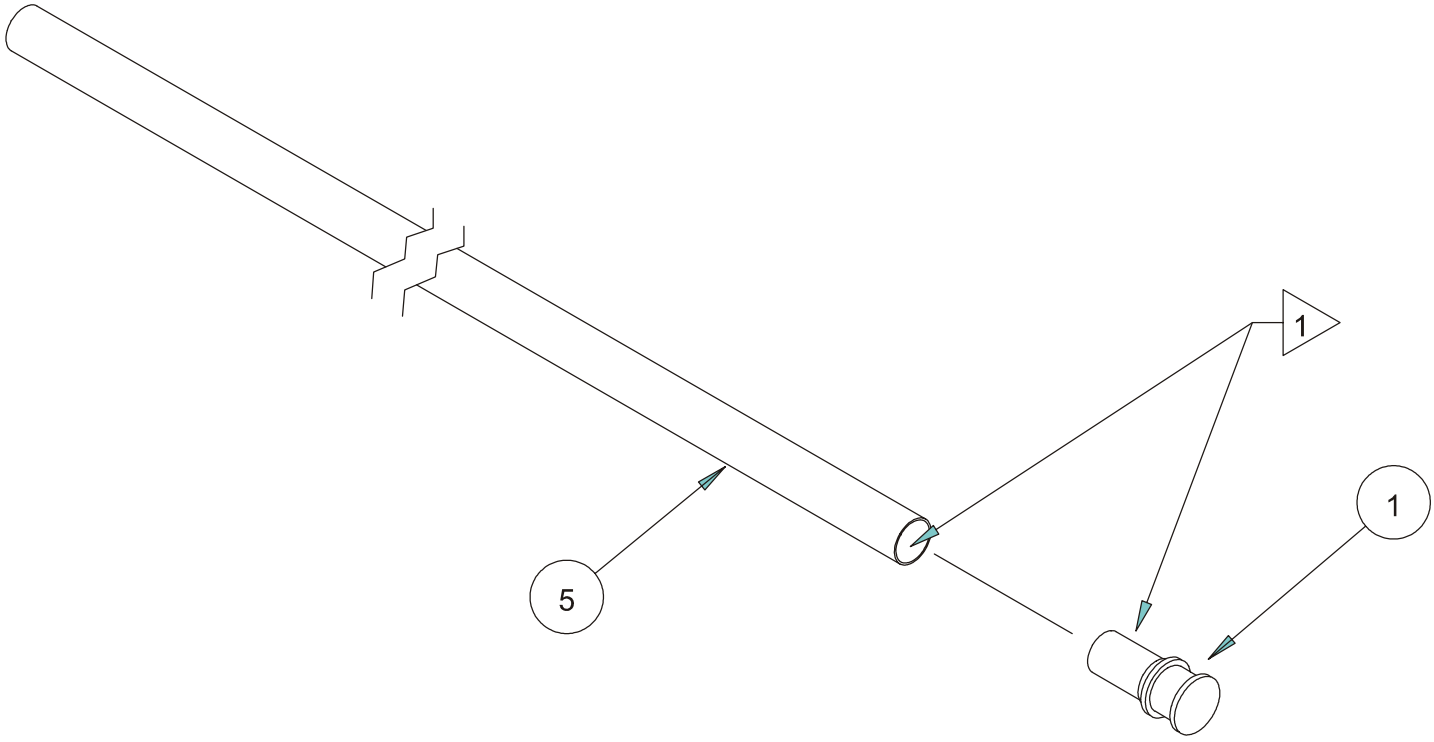
1. SECURE WITH LOCTITE 222.
2. CLEAN MATING SURFACES WITH ALCOHOL AND APPLY TWO PART EPOXY ADHESIVE. CLEAN AWAY ANY EXCESS ADHESIVE AFTER ASSEMBLY.

Take-up Shaft Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
105967	END, TAKE UP SHAFT, 600/28	1
104433	TAKEUP HUB	2
102839	SCREW #1/4-20, .25 LG, SH SET, CONE	3
106180	SHAFT, TAKEUP, SUMMIT 97	4
106181	SHAFT, FEED, SUMMIT 97	5

Feed Shaft Assembly

Part Number: 106264



NOTES:

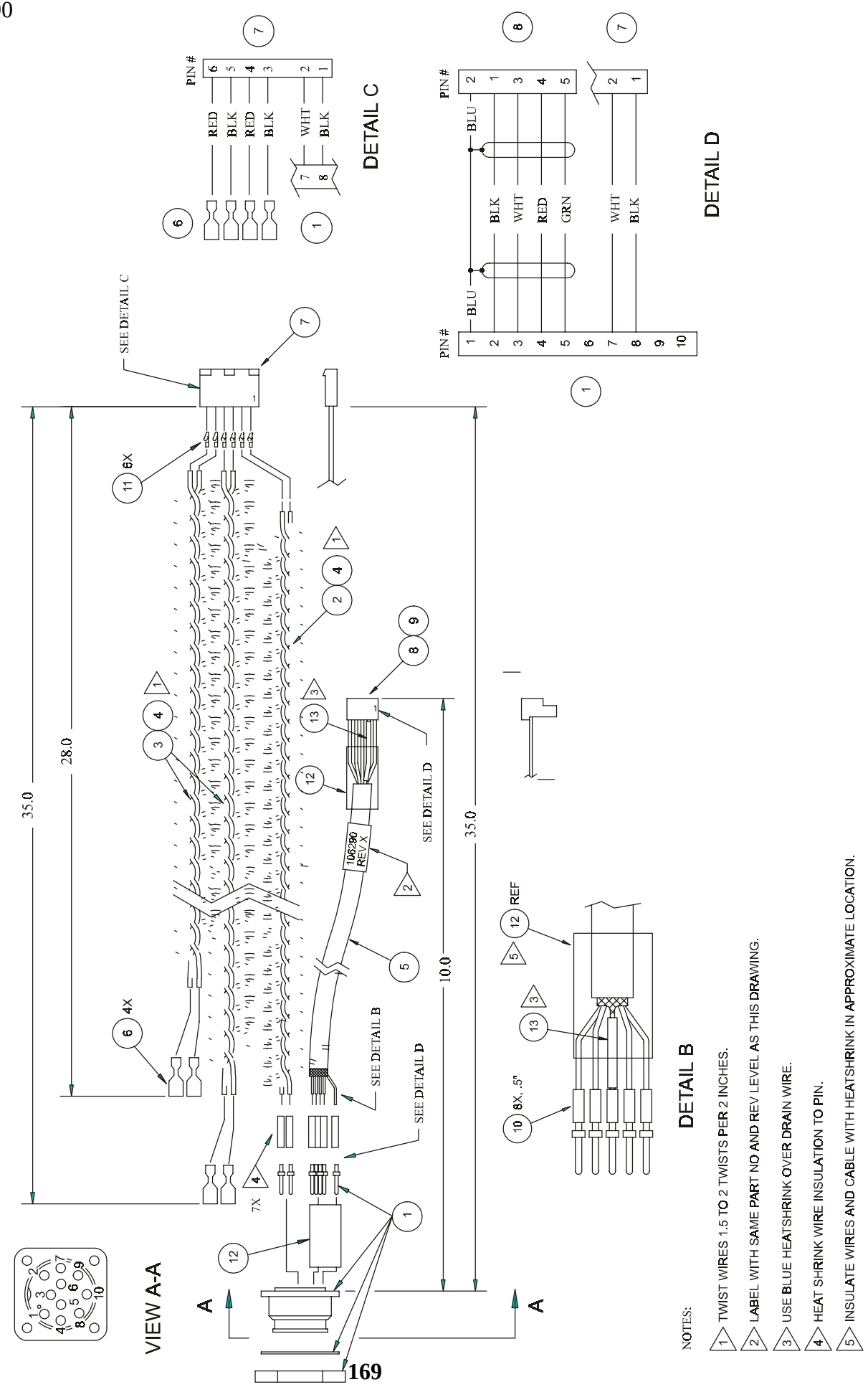
1 CLEAN MATING SURFACES WITH ALCOHOL AND APPLY TWO PART EPOXY ADHESIVE. CLEAN AWAY ANY EXCESS ADHESIVE AFTER ASSEMBLY.

Feed Shaft Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106192	END, FEED SHAFT, 600/28	1
106181	SHAFT, FEED, SUMMIT 97	2

Cable Assembly *(Power/Motors)*

Part Number: 106290



NOTES:

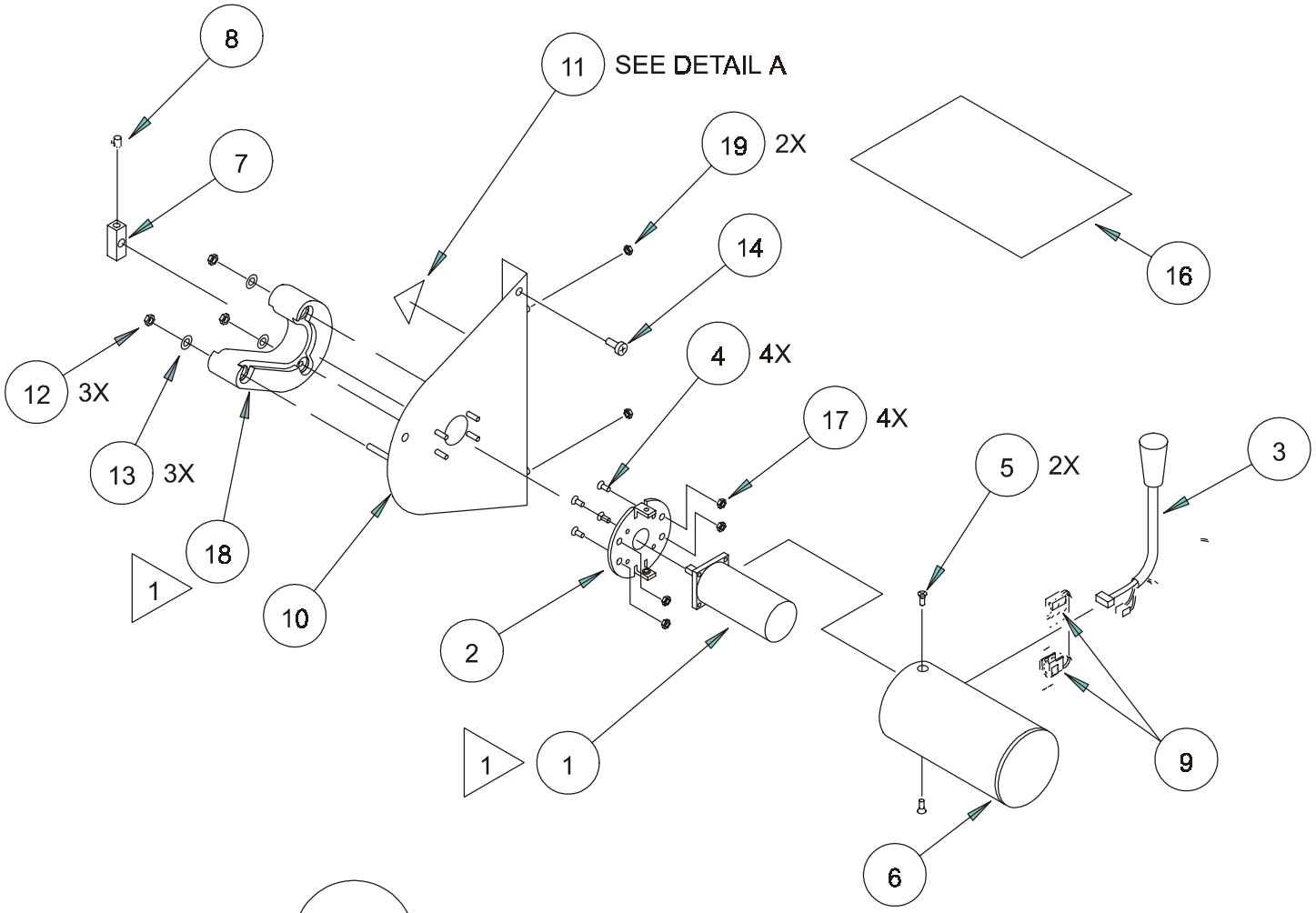
1. TWIST WIRES 1.5 TO 2 TWISTS PER 2 INCHES.
2. LABEL WITH SAME PART NO AND REV LEVEL AS THIS DRAWING.
3. USE BLUE HEATSHRINK OVER DRAIN WIRE.
4. HEAT SHRINK WIRE INSULATION TO PIN.
5. INSULATE WIRES AND CABLE WITH HEATSHRINK IN APPROXIMATE LOCATION.

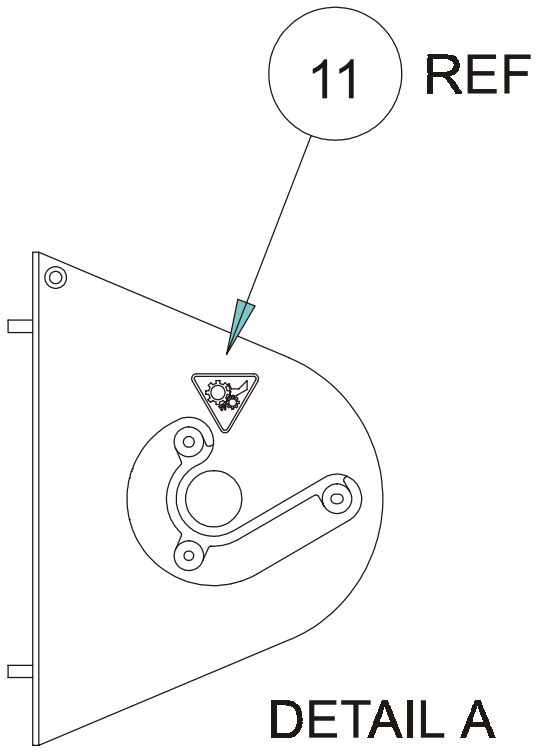
Cable Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106338	CONN, 10 PIN, LOCKING, FEMALE	1
104345	WIRE 18 GA ST WHT	2
104344	WIRE 18 GA ST RED	3
104339	WIRE 18 GA ST BLK	4
104323	CABLE 24 GA 4 COND SHLD DRN	5
100246	CONN, TERMINAL, .110, 18-22GA, INSU	6
105457	CONN, HSG, 1 X 6, .156 SP, FEMALE	7
102942	CONN, HSG, 1 X 5, FEMALE	8
102898	CONN, RECEPTACLE, COVER, 1 X 5, .1	9
102974	HEATSHRINK, .093 DIA, CLEAR	10
100284	CONN, CRIMP, INSERT, 18-24 GA, .156	11
101370	HEATSHRINK, .250 DIA, BLK	12
107183	HEATSHRINK, 3/32 INCH, BLUE	13

Take-up Transmission Assembly

Part Number: 106538





NOTES:

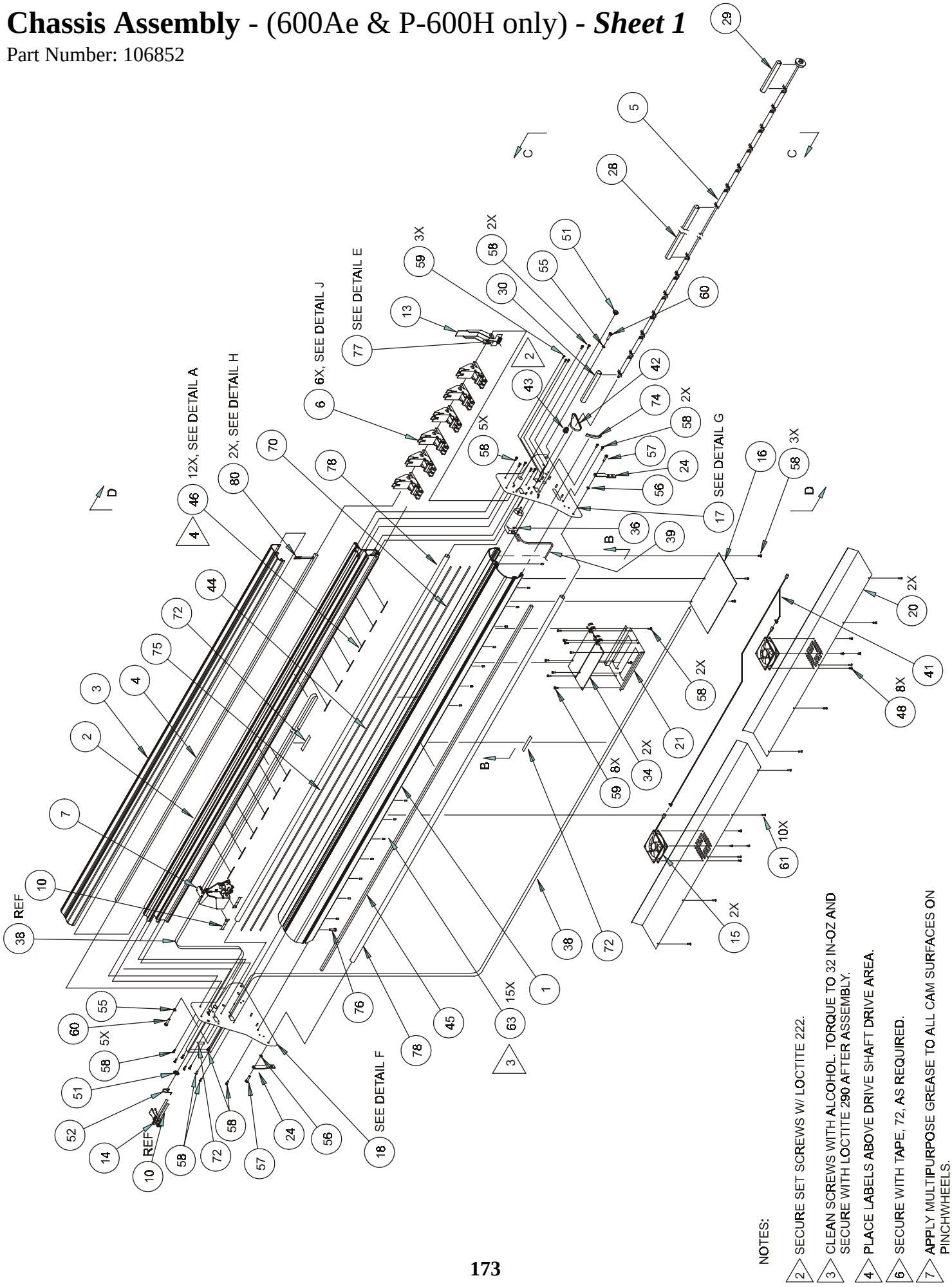
1 ALIGN MOTOR AND SUPPORT BLOCK TO ENSURE THE ASSEMBLY DOES NOT KNOCK.

Take-up Transmission Assembly Bill of Materials

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106271	PLANETARY GEARMOTOR	1
106435	MOTOR, GEAR, PLANETARY, 12V, LATCH	1
106300	PLATE, ADJ, PLANETARY MOTOR	2
106288	CABLE ASSY, TAKE UP, EXTERNAL	3
106434	CABLE ASSY, TAKE-UP, EXT, LATCH	3
106243	COVER ASSY, TAKE UP, P600	6
105969	KEY, TAKE UP, 600/28	7
106339	STRAIN RELIEF, PLASTIC, .30-.35 ID	9
106345	PLATE, TAKEUP, RIGHT, P600	10
105932	LABEL, WARNING, PINCH HAZARD	11
105973	SUPPORT BLOCK, TAKEUP, S97	18
106274	SCREW, #6-32 X .375 LG, FHCS	4
101581	SCREW #8-32, .375 FHP, BLACK	5
106334	SCREW #1/4-20, .375 LG, SET, CUP	8
104717	NUT, #10-32, HEX, NYLOCK	12
103389	WSHR, #10, FLAT, STEEL	13
106340	SCREW, #1/4-20, .375 LG, SHCS	14
104013	NUT, #8-32, KEP	17
100113	NUT, #1/4-20, HEX, NYLOC	19
106537	PROC, INST, GEARMOTOR 600/28	16

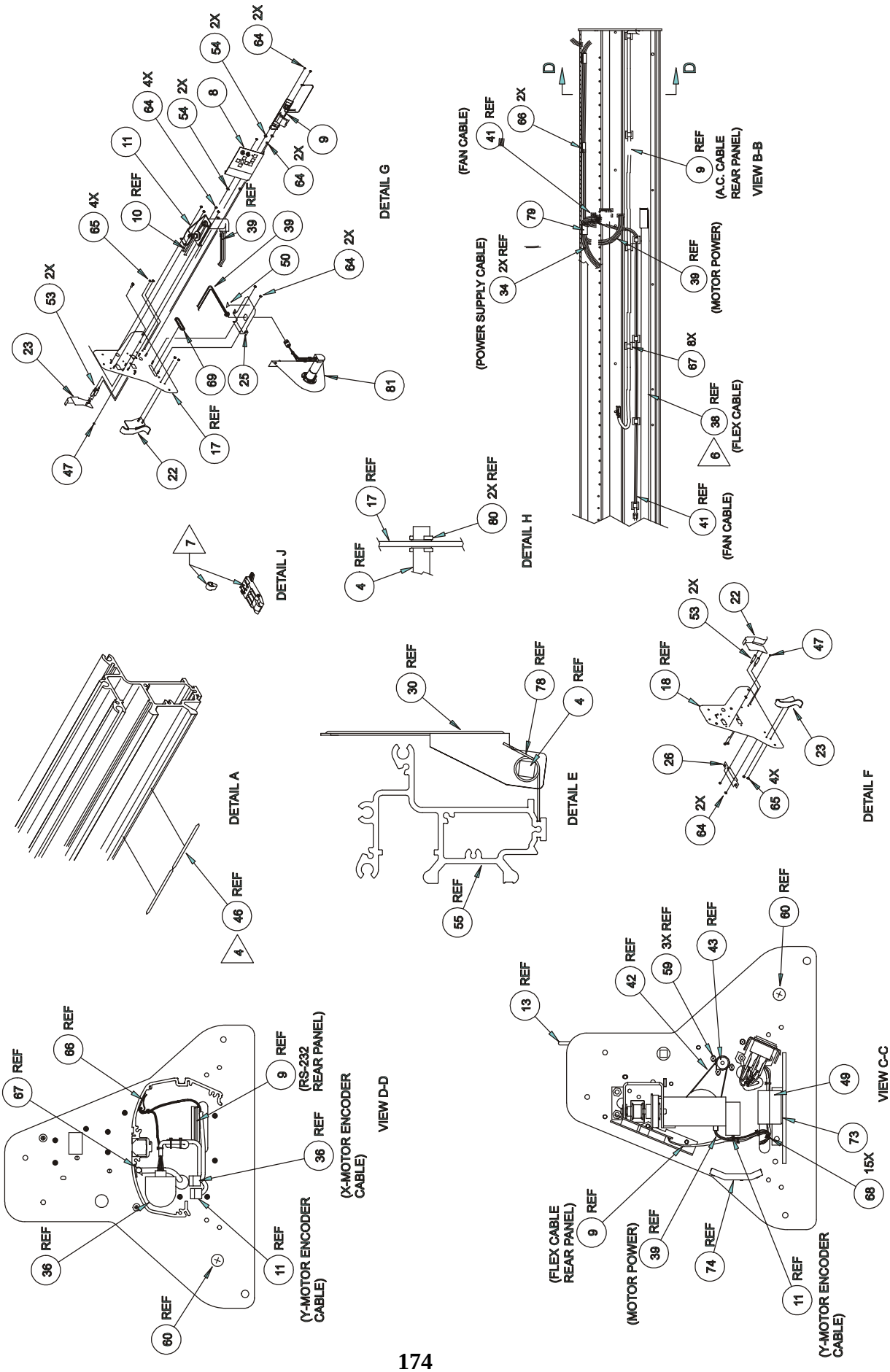
Chassis Assembly - (600Ae & P-600H only) - ***Sheet 1***

Part Number: 106852


NOTES:
2 SECURE SET SCREWS W/ LOCTITE 222.
3 CLEAN SCREWS WITH ALCOHOL. TORQUE TO 32 IN-OZ AND SECURE WITH LOCTITE 290 AFTER ASSEMBLY.
4 PLACE LABELS ABOVE DRIVE SHAFT DRIVE AREA.
6 SECURE WITH TAPE, 72, AS REQUIRED.
7 APPLY MULTIPURPOSE GREASE TO ALL CAM SURFACES ON PINCHWHEELS.

Chassis Assembly - (600Ae & P-600H only) - ***Sheet 2***

Part Number: 106852



Chassis Assembly (600Ae & P-600H) *Bill of Materials*

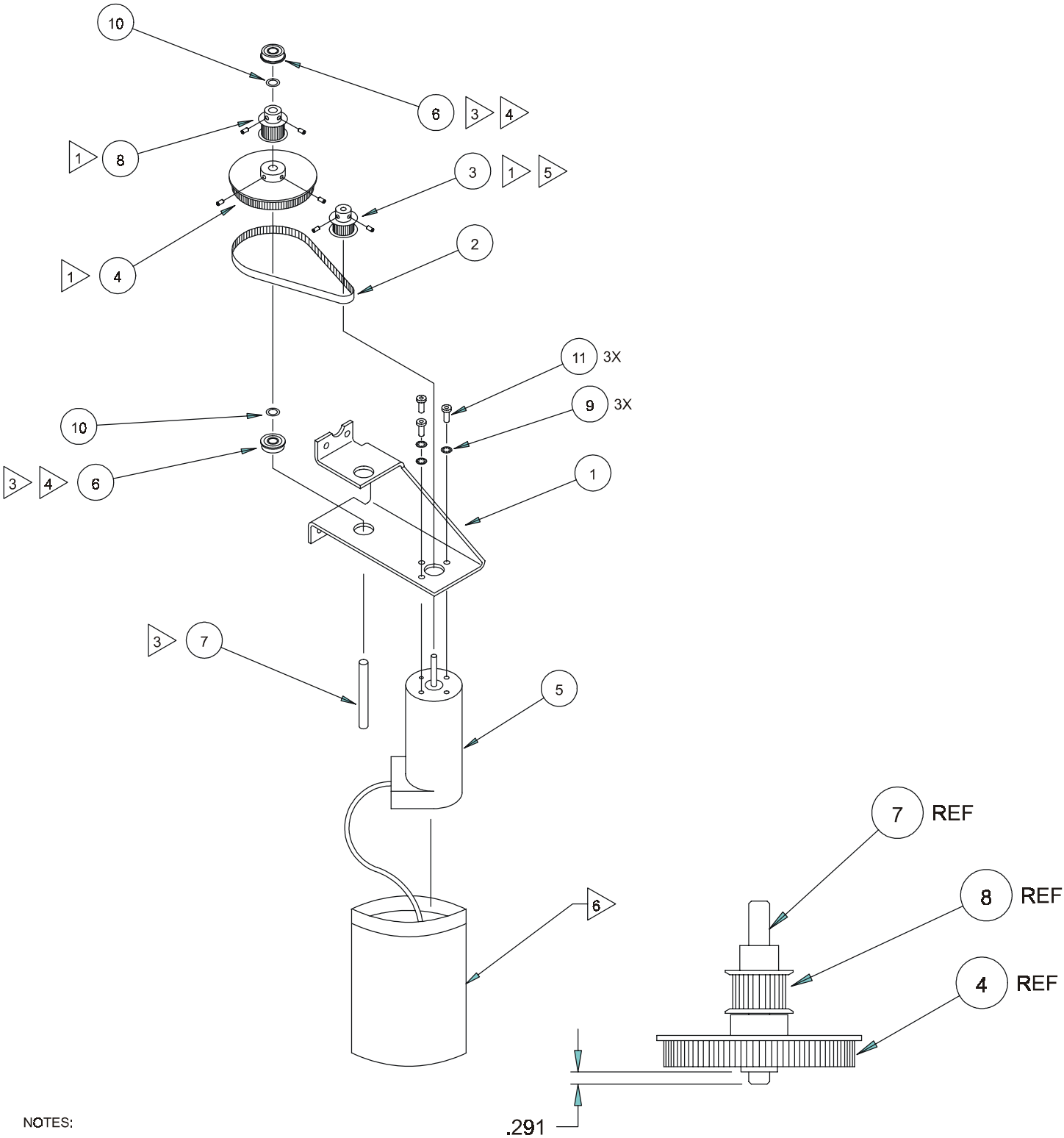
COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106868	PINCH WHEEL ASSY, 12 LB, PLASTIC	6
107215	PINCHWHEEL ASSY, 6 LB, 1:1, PLASTIC	6
107020	CARRIAGE ASSY, I/S-600, METAL	7
107367	CARRIAGE ASSY, RETURN SPRING, 600AE	7
106866	KEYPAD ASSY, 600A	8
106867	REAR I/O PANEL ASSY, I/S-600	9
107046	REAR I/O PANEL ASSY, 600H/28H	9
106817	TRANS ASSY, Y DRIVE, 24V	11
106974	TRANS ASSY., 2.5:1, Y DRIVE	11
106847	PLATE, DUCT, I/S-600	19
106849	BRACKET, POWER SUPPLY, I/S-600/28	21
105963	CHANNEL, RIGHT, FRONT, SUMMIT 97	22
105964	CHANNEL, LEFT, FRONT, SUMMIT 97	23
106233	BRACKET, HINGE, SUMMIT 97	24
106231	PLATE, CAP, RIGHT, P600	25
106232	PLATE, CAP, LEFT, SUMMIT 97	26
106956	DUCT, FAN	27
106853	COVER, DRIVESHAFT, 23.65 LG	28
107411	SPACER, DRIVESHAFT, PL, 23.61 LG	28
106958	COVER, DRIVESHAFT, 6.05 LG	29
107409	SPACER, DRIVESHAFT, PL, 6.05 LG	29
106959	COVER, DRIVESHAFT, 6.75 LG	30
107410	SPACER, DRIVESHAFT, PL, 6.75 LG	30
106628	SPACER, BEARING, DRIVESHAFT, LONG	31
106854	SPACER, BEARING, DRIVESHAFT, .61 LG	32
106602	GASKET, FAN DUCT	33
106435	MOTOR, GEAR, PLANETARY, 12V, LATCH	35
106952	MOTOR, GEAR, PLANETARY, 24V, LATCH	35
106300	PLATE, ADJ, PLANETARY MOTOR	37
106290	CABLE ASSY, TU & POWER, INT	39
106434	CABLE ASSY, TAKE-UP, EXT, LATCH	40
105338	CABLE ASSY, 2 FAN ADAPTER	41
106207	CABLE ASSY, 2 FAN ADAPT, SUMMIT 97	41
106967	STRIP, MEDIA CUTTER, I/S 600/28	45
106081	LABEL, WARNING, HAZARD, VOLTAGE	50
106649	LABEL, DRIVE AREA	46
100705	PAD, PEN CAP, 1/4 DIA	47
106652	RIVET, PLASTIC, .2 GR X .169 OD	48
106693	BUSHING, NYLON,.52ID, .62OD, .75FL	51
106239	STANDOFF, M/F, #10-32, 1.125LG, S97	53
106241	WSHR,#8-32,.190 ID,.416 OD,.080THK	54
106186	WASHER, .265 ID, .625 OD	55
102159	WSHR, .250ID, .500OD, .0626THK, FLA	56
101934	SCREW 1/4-20, 1.00 LG, BTN HD SOCK	57
104180	SCREW, #8, .50 LG, SLF TAP, PHP, SE	58
104713	SCREW #6-32, .375, PHP SEMS	59
100026	SCREW #6-32, .5 LG, PHP, SEMS	59
106176	SCREW, 1/4-20 1" LONG THP	60
104590	SCREW #8, .50 LG, ST, FHP	61
106274	SCREW, #6-32 X .375 LG, FHCS	62
102726	SETSCREW #10-32, .75 LG, STEEL	63

Chassis Assembly (600Ae & P-600H) Bill of Materials (Cont...)

104013	**NUT, #8-32, KEP**	**64**
104717	**NUT, #10-32, HEX, NYLOCK**	**65**
100279	**CONN, CABLE CLIP**	**66**
103026	**CONN, CABLE CLIP, .18 DIA**	**67**
103027	**TYRAP, .1 IN X 5 3/4 LG**	**68**
104726	**GROMMET STRIP, CONTINUOUS 7/64**	**69**
106667	**TAPE, DOUBLE COATED, .30" WIDE**	**70**
106666	**TAPE, DUCT, 2.0" WIDE**	**71**
103740	**TAPE, FOAM, .5 IN, .025 THICK**	**72**
106528	**TAPE, DOUBLE COATED, 1.25 W**	**73**
107042	**STRIP, FILLER, RUBBER**	**74**
104471	**TAPE, UHMW, .43 WIDE**	**75**
102281	**SCREW #10-32, 1.0 LG, PHP**	**76**
104152	**CLIP, CABLE, .50 DIA**	**79**
107211	**COTTER PIN, 1/8 X .75**	**80**
106751	**PLATEN, I/S 600/28**	**1**
106756	**TRAVERSE, I/S 600/28**	**2**
106858	**DUST COVER, I/S-600/28**	**3**
106845	**SHAFT, CAM, I/S 600**	**4**
106856	**DRIVE SHAFT ASSY, I/S-600**	**5**
107180	**DRIVESHAFT 600, PHASE 2**	**5**
106857	**Y-BELT ASSY, I/S-600**	**10**
106684	**LEVER ASSY, PINCHWHEEL, REAR**	**13**
106708	**TENSIONER ASSY, SC98**	**14**
104745	**FAN ASSY, W/ CABLE**	**15**
106928	**PCB ASSY, 68331, 600AE PROG**	**16**
107386	**PCB ASSY, 68331, V-REG, PROG, 600AE**	**16**
106758	**END PLATE, RIGHT,I/S 600/28**	**17**
106759	**END PLATE, LEFT, I/S 600/28**	**18**
106848	**COVER, BOTTOM, I/S-600/28**	**20**
104753	**POWER SUPPLY**	**34**
106816	**MOTOR, SERVO, 24V**	**36**
107347	**MOTOR, 5MM SHAFT, SERVO, 24V**	**36**
105509	**CABLE, FLEX, 12 COND., 2200**	**38**
106550	**BELT, .080 X 1/4 X 100T**	**42**
105933	**PULLEY, 16T X .080 X 1/4**	**43**
107346	**PULLEY, 5MM BORE, 16T X .080 X 1/4**	**43**
107040	**STRIP, MEDIA CUTTER, GREY**	**44**
107041	**STRIP, CUTTING, WHITE**	**44**
106695	**FERRITE, SPLIT, 100MHZ, .74IDX1.6L**	**49**
106654	**CLIP, SPRING, SQR SHAFT, .375**	**52**
106951	**SPRING, TORSION, .53 ID, .045 WIRE**	**77**
105929	**TOP BAR ASSY, 600**	**78**
107233	**TAKE-UP ASSY, RIGHT, 600AE**	**81**

“Y” Axis Transmission Assembly - (600Ae & P-600H only)

Part Number: 106974



NOTES:

1. SECURE ALL PULLEY SET SCREWS WITH LOCTITE 222. BE SURE ONE SET SCREW IS AGAINST FLAT ON SHAFT.
3. CLEAN MATING SURFACES OF BEARINGS, ITEM 6, AND BRACKET, ITEM 1, WITH LOCTITE PRIMER N. SECURE BEARINGS TO PLATES WITH LOCTITE 609.
4. ADD A SMALL4 ADD A AMOUNT OF LOCTITE THREAD LOCKER 290 TO INNER RACE ID OF BEARINGS, ITEM 6. CAUTION: ID OF BEARINGS, ITEM 6. WIPE OFF ALL EXCESS LOCTITE. DO NOT ALLOW ANY TO GET INSIDE BEARING.
5. INSTALL PULLEY SO THAT THE GAP BETWEEN THE PULLEY FLANGE AND BRACKET IS .100±.010.
6. MOTOR, ITEM 5, IS STATIC SENSITIVE. COVER MOTOR AND CONNECTOR WITH 3 X 5 STATIC BAG AND SECURE WITH A RUBBER BAND.

CAUTION

SENSITIVE ELECTRONIC DEVICES

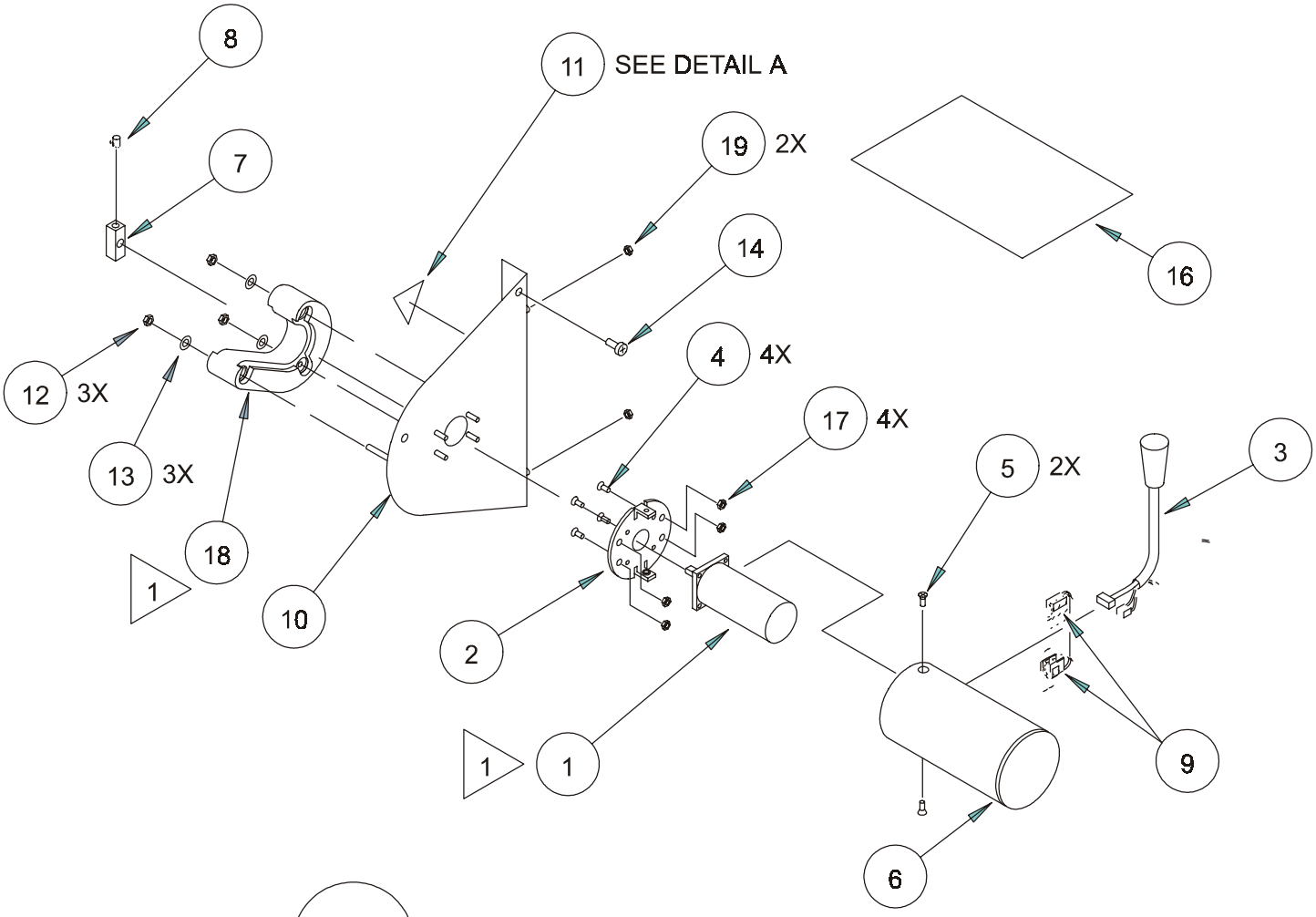
DO NOT SHIP OR STORE NEAR STRONG ELECTROSTATIC, ELECTROMAGNETIC, MAGNETIC OR RADIOACTIVE FIELDS

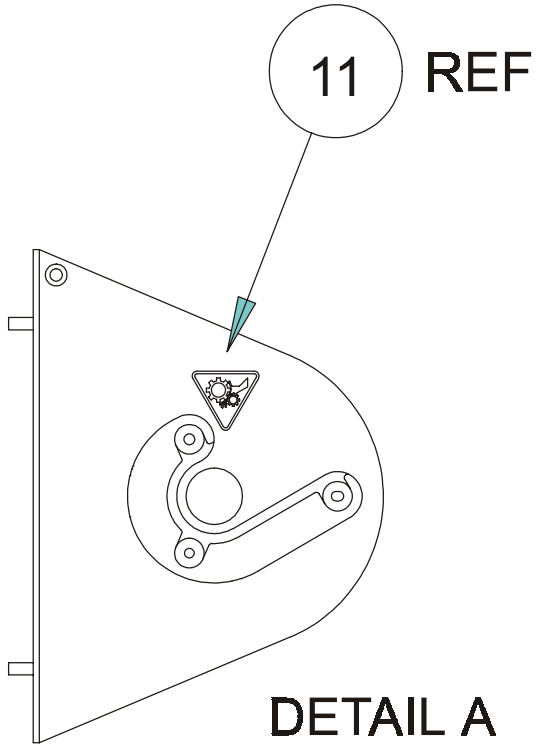
"Y" Axis Transmission Assembly Bill of Materials (600Ae & P-600H only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
105935	BRACKET, Y TRANS, SUMMIT 97	1
106975	BELT, .080 X 1/4 X 114T	2
104636	PULLEY, 24T X .080 X 1/4	3
107326	PULLEY, 5MM BORE, 24T X .080 X 1/4	3
105934	PULLEY, 60T X .080 X 1/4	4
106816	MOTOR, SERVO, 24V	5
107347	MOTOR, 5MM SHAFT, SERVO, 24V	5
100317	BEARING, BALL, .25ID, .625OD, .196	6
104830	PIN, Y DRIVE	7
104730	PULLEY, .080 X 3/8 X 25T	8
100080	WSHR, #6, LOCK, EXT STAR	9
100111	SPACER, .254ID, .375OD, .030LG, GOL	10
104975	SCREW #6-32, .375 LG, BTN HD	11

Take-up Transmission Assembly - (600Ae & P-600H only)

Part Number: 107233





NOTES:

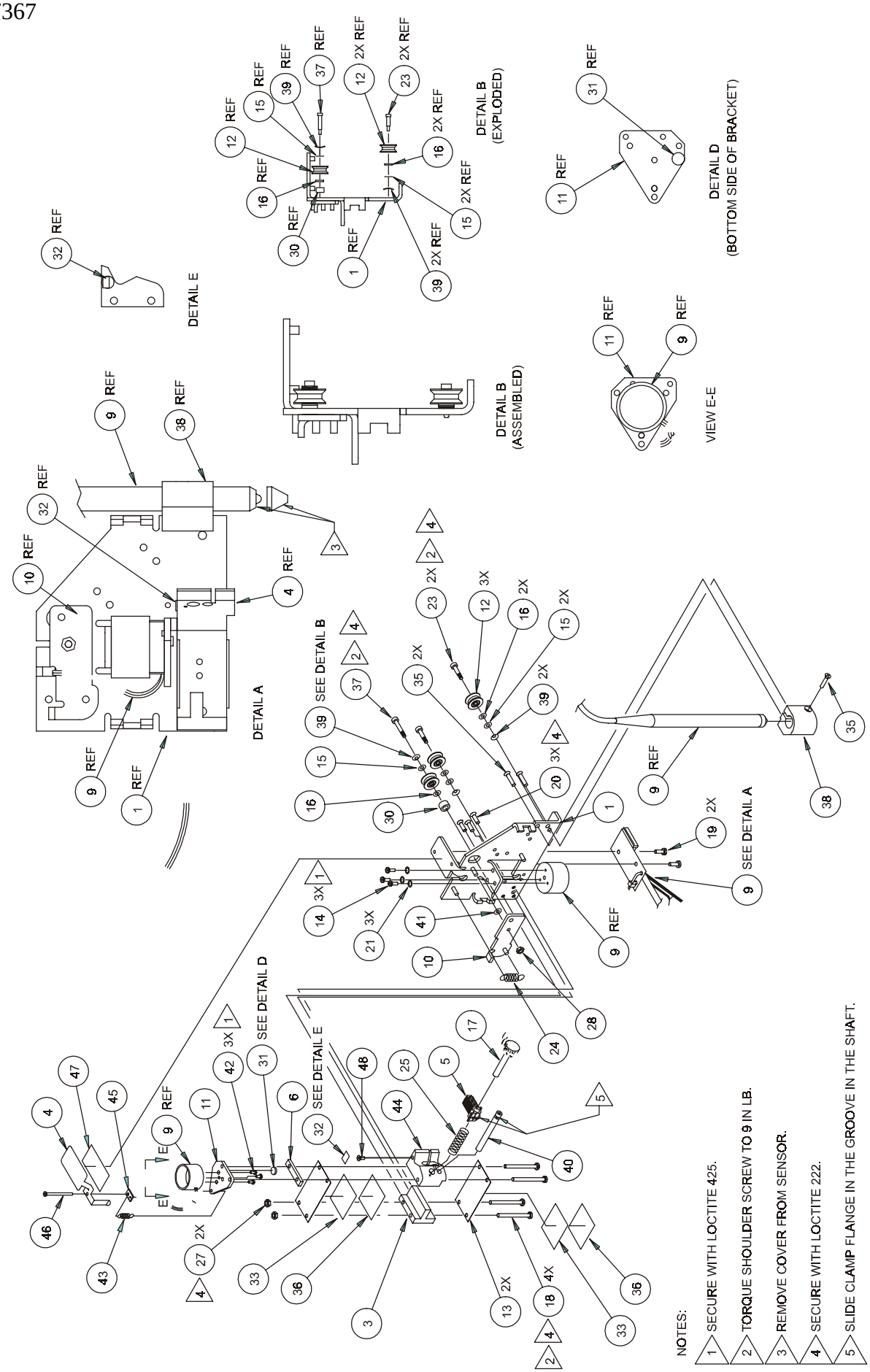
1 ALIGN MOTOR AND SUPPORT BLOCK TO ENSURE THE ASSEMBLY DOES NOT KNOCK.

Take-up Transmission Assembly Bill of Materials (600Ae & P-600H only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106277	SUPPORT BLOCK, 600A	1
106834	PLATE, TAKE-UP, RIGHT, I/S 600	2
105932	LABEL, WARNING, PINCH HAZARD	3
104717	NUT, #10-32, HEX, NYLOCK	4
103389	WSHR, #10, FLAT, STEEL	5
106340	SCREW, #1/4-20, .375 LG, SHCS	6
105969	KEY, TAKE UP, 600/28	7
106334	SCREW #1/4-20, .375 LG, SET, CUP	8
106952	MOTOR, GEAR, PLANETARY, 24V, LATCH	9
106300	PLATE, ADJ, PLANETARY MOTOR	10
106274	SCREW, #6-32 X .375 LG, FHCS	11
106434	CABLE ASSY, TAKE-UP, EXT, LATCH	12
104013	NUT, #8-32, KEP	13

Carriage Assembly - *(600Ae & P-600H only)*

Part Number: 107367



Carriage Assembly Bill of Materials (600Ae & P-600H only)

COMPONENT PART NUMBER	COMPONENT DESCRIPTION	DRAWING NUMBER
106863	BASE, CARRIAGE, I/S-600/28	1
106864	BRACKET, SENSOR, CARRIAGE, I/S-600	2
106464	BLOCK, SPACER, FLEXURE	3
106622	JAW, CARRIAGE, SC98	4
107208	BRACKET, CALIB CARRIAGE, I/S	4
106523	CLAMP, PEN/KNIFE, CARRIAGE	5
106772	CLAMP, PEN/KNIFE, MOLDED	5
106455	SPACER, MOUNT, VC, SC98	6
106949	DOWEL, PIN .0625DIA. X .625	7
106954	FILTER, SENSOR LENS	8
106869	PCB ASSY, CARRIAGE, I/S-600	9
106236	PCB ASSY, CARRIAGE, P600	9
106458	ARM, CARRIAGE, SC98	10
106460	MOUNT, VC, CARRIAGE, SC98	11
106230	WHEEL, CARRIAGE, SC98	12
106254	FLEXURE, CARRIAGE, Z-AXIS	13
103481	WSHR, .196ID, .312OD, .062TH, NYLON	22
106073	SCREW, SHOULDER, .187 DIA, .375 LG	23
106462	SPRING, EXTENSION, .25 OD, .037 DIA	24
107178	SPRING, EXT, .25 OD, .04 ID, 75 LG	24
106621	SPRING, COMP., .24 OD, 1.25 LG	25
106130	NUT, #10-32, ROUND THUMB	26
103726	TYRAP, .1 IN X 3 IN, BLACK	29
106115	SPACER, .188 ID, .313 OD, .188 LG	30
100705	PAD, PEN CAP, 1/4 DIA	31
106750	CAP, VINYL, .093 ID, BLK	32
106457	PLATE, FLEXURE	36
106526	SCREW, SHOULDER, .187 DIA, .5625 LG	37
107058	BRACKET, SENSOR, TUBE	38
106094	WASHER, SPRING, .193 ID, .370 OD	39
107014	SHAFT, CLAMP STOP, CARRIAGE	40
107274	WSHR, .5 OD, .145 ID, .010 T, PTFE	41
106314	SCREW, #4-40, .25 LG, PHP, NYLON	42
107330	SPRING, EXT, .185 OD, .013D, .632LG	43
107331	JAW, CARRIAGE, MOLDED CLAMP, I/S	44
107206	PLATE, CALIBRATION, CARRIAGE, I/S	45
107278	SCREW, #4-40, 1.25 LG, PHP, SS	46
106528	TAPE, DOUBLE COATED, 1.25 W	47
107332	SCREW, #6-32, FLAT HEAD, SOCKET,BLK	48
101860	SCREW #2-56, .312 LG, PHP	14
106626	WSHR, .195 ID, .245OD, .02 THK	15
106530	WSHR, .195 ID, .245 OD, .03 THK	16
106524	SCREW, #10-32, 2.OO LG, BHCS	17
106777	SCREW, THUMB, #10-32, 1.33 LG	17
106307	SCREW, #6-32, 1.25" LG, BHCS	18
104337	SCREW #4-40, .375 PHP, SEMS	19
104560	SCREW #4-40, .250 PHP, SEMS	19
106527	SCREW, #6-32, .312 LG,FHP, BLK	20
103896	WSHR, #2, FLAT, STEEL	21
106625	NUT, #6-32, HEX, SMALL PATTERN	27

Carriage Assembly Bill of Materials (600Ae & P-600H only) (Cont...)

106532	**NUT, #6-32, HEX, NYLOCK**	**28**
104471	**TAPE, UHMW, .43 WIDE**	**32**
106528	**TAPE, DOUBLE COATED, 1.25 W**	**33**
106358	**TAPE, DOUBLE COATED, .5 IN WIDE**	**34**
107018	**SCREW, #6-32, .625 LG, FHP**	**35**
107381	**SCREW, #6-32, 1.0 LG, FHP**	**36**
107018	**SCREW, #6-32, .625 LG, FHP**	**38**

P-600 Interconnect Diagram
(All Models)